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OCTOBER 1991

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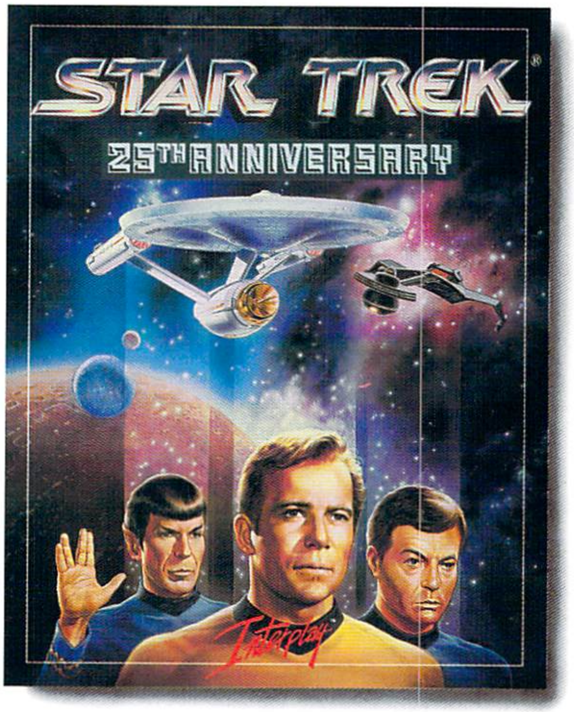

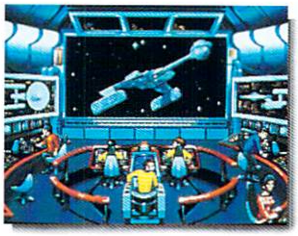

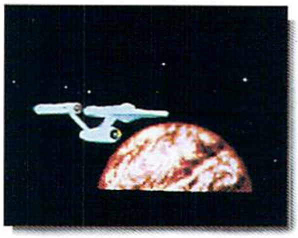

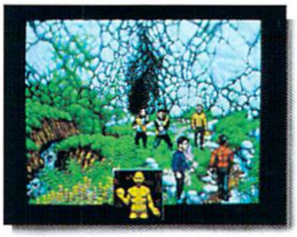

MS-DOS Screens Pictured.

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Circle Reader Service Number 134

ONLINE
COMMUNICATIONS

COMPUTE's

GETTING STARTED WITH™

WHY YOU SHOULD GO ONLINE 2
Whatever you're into, you can find an online group that's devoted to it.

COMPUTE **GOES ONLINE** 3
Put away your pen and stationery—*COMPUTE* is just an autodial away.

HOW TO CHOOSE A MODEM 4
Contrary to popular opinion, all modems are not created equal.

HOW TO CHOOSE A COMMUNICATIONS PROGRAM 5
A modem without the right program is like a radio without an antenna.

HOW TO CHOOSE AN ONLINE SERVICE 8
Talk is cheap—even when you pay for your words by the minute.

ONLINE SERVICE SAMPLER 10
Six top online services, each with its own distinct personality.

ONLINE COMMUNICATIONS GLOSSARY 16
How can you communicate if you don't know what the words mean?

WHY YOU SHOULD GO ONLINE

DAVID ENGLISH

In the 1970 movie, *Colossus: The Forbin Project*, the largest American computer demands to be connected to the largest Soviet computer so that the two computers can share their enormous data banks. It seems that curious computers and intelligent humans always want to know more about the world around them.

This urge to merge has grown even stronger over the last two decades. In the 1970s, we networked our dumb terminals by wire to the nearest large computer. In the 1990s, we can connect our personal computers by phone to just about any computer—large or small. With personal computers, you can have a network based on choice. The result is a series of global communities created not by geography but by interest.

- If you're a professional musician, you can chat about music with an electronic community of musicians on PAN (Performing Artists Network)—even though you live in a mountain lodge in Arkansas and your electronic neighbor lives in an apartment building in downtown Tokyo.
- If you're an animal-rights activist, you can organize an effective letter-writing campaign by leaving a message on GEnie's Pets RoundTable—even though you have no idea where any of the members live.
- If you have to write a research paper and need information on the various federal agency libraries, you don't have to travel to Washington, D.C. You can stay where you are and use your modem to call the Library of Congress BBS.
- If you're a beginning poet, you can find other poets on the major online services who will gladly read and critique your writing.

No More Excuses

Whatever your interests—music, sports, investments, grassroots politics, movies, programming, science fiction—there are online communities devoted to the things that you're into. And now that modems and communications software are cheaper than ever, there's really no excuse for not getting involved in online communications. ❑

COMPUTE GOES ONLINE

Ever wish you could download an article from *COMPUTE* into your word processor or talk with a *COMPUTE* editor? Maybe you'd like to replace a lost disk from a back issue of *COMPUTE!'s PC Magazine* or find a COMPUTE book that's been out of print for several years. Now you can do all these things with a single phone call, 24 hours a day.

Starting immediately, you can go online with *COMPUTE* on either GEnie or America Online. You'll find complete back issues of all the *COMPUTE* magazines for the years 1991, 1990, and 1989; previously published disk products for PC, Amiga, Commodore 64, and Atari ST computers; the complete text of out-of-print COMPUTE books; excerpts from currently published COMPUTE books; digitized NASA photos; special feature sections for *COMPUTE's Getting Started with . . .* booklets and *COMPUTE's* Test Lab; and application macros and templates. You'll also be able to order COMPUTE products online.

Over the coming months, we'll be adding a submarine simulator game and back issues from years prior to 1989. On GEnie, we'll also have a complete bulletin board, covering such topics as software tips, *Windows,* industry rumors, feedback to editors, programming, hardware care and maintenance, and much, much more.

To reach us on GEnie, type COMPUTE. On America Online, make your way to the main menu, click on the Computer and Software icon, click on the Computer News and Magazines icon, and click on the COMPUTE icon.

Look for more information in the main part of this month's *COMPUTE*—including instructions on how to sign up for GEnie and America Online.

—David English

HOW TO CHOOSE A MODEM

TONY ROBERTS

If you're going to link up with bulletin boards and information services, you'll need a modem. For general telecommunications tasks, such as logging on to bulletin boards and downloading files, nearly any modem will do. The amount you should spend and the features you should look for depend on how much you'll use your modem. Consider these items when selecting a modem:

- Hayes compatibility. The Hayes command set is a group of commands that communications software uses to configure the modem. It was introduced in the early 1980s in modems produced by Hayes Microcomputer and has since become the standard. You'll want Hayes compatibility in a modem.
- Speed. Currently, there's no point buying any modem slower than 2400 bits per second (bps). Although information services such as GEnie and CompuServe are adding 9600-bps nodes, most casual users will find 2400 bps adequate.
- Error correction and compression. Once found only in the most expensive modems, error correction and compression capabilities are now available in many lower-priced models. Error correction protocols include Microcom Network Protocols (MNP) 2-4 and CCITT V.42. Compression schemes include MNP 5 and CCITT V.42bis. In order for error correction and compression to work, modems on both ends of the line must have the same capabilities.
- Internal versus external. The choice depends on your setup. An external modem needs a serial port, a data cable, and an AC outlet; it also occupies desk space. On the plus side, you can easily move an external modem from computer to computer. Because internal modems don't require a power supply or case, they're usually a little less expensive. In addition, you can usually configure an internal modem for COM3 or COM4 if your other serial ports are occupied.
- Fax options. Many modems include some fax capability. This can be a real convenience, letting you send faxes from your PC rather than having to wait in line for the office fax machine. ❑

HOW TO CHOOSE A COMMUNICATIONS PROGRAM

MICHAEL A. BANKS

While most of the features in communications programs are there because users need them, many others are added simply to keep up with the competition. Because of this, buyers are faced with a dizzying array of features and options—many of which they may not need. Here are some of the more important features to look for.

- Command set compatibility. A communications program must use a command set that's recognized by the modem with which it's used. This will, more often than not, be the AT command set—or a subset of it.
- Variable communications parameters. At the very least, you should be able to change these parameters: communications speed (bits per second), the number of data bits in each character, the number of stop bits used, parity, and echoplex (duplex).
- Automatic dialing support. Most modems can dial a number automatically. They can accept a number from the communications program (or one entered by the user) and dial the number without using a telephone set. If you use this kind of modem, you'll naturally want software that supports autodialing. It should issue the commands necessary to tell the modem to take the phone line "off hook" and dial a number.
- Originate/answer mode switching. If you plan to use your computer and modem to receive as well as make calls, your software must support switching between the originate mode (make a call) and answer mode (receive a call). Manual-dial modems usually have an external switch to perform this function. Autodial modems usually rely on software commands to switch between originate and answer modes.
- Telephone hangup. Most BBSs and online services automatically disconnect at sign-off. There are some systems, however, that rely on

the calling system (your system) to disconnect. A remote system can also become stuck or go berserk and start displaying text or garbage on your screen. If the software can't hang up the telephone, you'll have to turn off your modem or unplug the telephone line.

- Autologon files. Signing on to a BBS or online service requires several steps, including ID and password entry. If you're accessing an online service via a packet-switching network, there are additional steps involving routing your call to the online service. Fortunately, the sign-on process can be automated if your software provides autologon files (also known as script files or command files). Programs such as *Crosstalk XVI*, *Crosstalk for Windows*, and *Mirror III* come with template files for various online services. All you have to do is supply your telephone number, user ID, and password.
- Parameter files. Programs that don't have a full scripting language may at least allow you to store telephone numbers and parameters in files that you can load into memory. Such files save you the trouble of entering communications parameters every time you dial a system, although you still have to go through the sign-on process manually.
- Dialing directories. A dialing directory may store telephone numbers and communications parameters, or it may store only telephone numbers. Numbers (and parameters, if included) are usually stored in a directory format, accessible by name. With the proper command, the program can retrieve a specified number from a directory file and direct the modem to dial it.
- Capture buffer. If you're a slow reader, you may spend more time than you wish online, pausing the screens of text. If your software provides a capture buffer, you can hold and temporarily store text. Most communications programs with capture buffers allow you to access the text in the capture buffer and store it in a disk file.
- Backscrolling. Many programs that provide a capture buffer also provide a feature called backscrolling. This feature allows you to view (scroll back over) text in the capture buffer. Backscrolling is handy when you need to review something that has scrolled off your screen.
- Binary-file transfer protocols. A binary-file transfer protocol (also called error-checking protocol) is necessary if you intend to transfer programs or binary data files. This is because some of the characters used in such files appear as end-of-file markers to a receiving system if

they're being transferred as straight ASCII files. Your communications software package should offer at least one binary-file transfer protocol. The most popular protocols are XMODEM, ZMODEM, and Kermit, although several others are in use on various systems, among them YMODEM and Windowed XMODEM.

Straight Versus Front-End

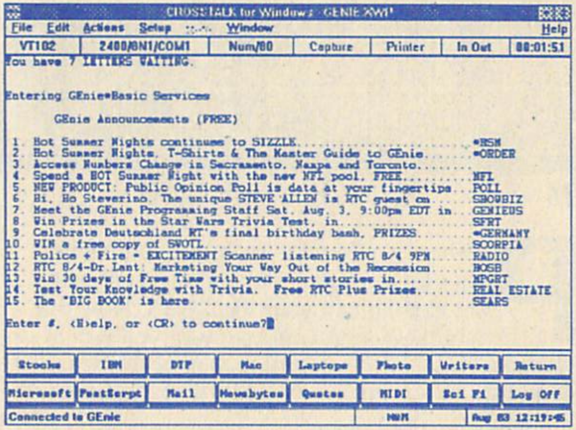
Communications software comes in two broad categories: straight and front-end. A straight program is a general-purpose telecommunications program, while a front-end program is designed to communicate with a specific online service.

Because a front-end program is dedicated to a single service, it's much easier to use it to automate such tasks as E-mail, bulletin board postings, and file transfers. Software packages in this category include *Aladdin* for GEnie, *Lotus Express* for MCI Mail, and *CompuServe Information Manager* for CompuServe.

Menu Driven Versus Command Driven

Like most application programs, communications software is either menu driven or command driven. Which way a program operates can be very important in terms of your personal preferences.

A menu-driven program lets you select commands from a menu or menus. It may provide one menu containing all the commands, or it may use a main menu from which you can select submenus.



```
You have 7 LETTERS WAITING.


Entering GEnie*Basic Services

     GEnie Announcements (FREE)

 1. Hot Summer Nights continues to SIZZLE........................*HSM
 2. Hot Summer Nights, T-Shirts & The Master Guide to GEnie......*ORDER
 3. Access Numbers Change in Sacramento, Naapa and Toronto.......
 4. Spend a HOT Summer Night with the new NFL pool, FREE.........NFL
 5. NEW PRODUCT: Public Opinion Poll is data at your fingertips...POLL
 6. Hi, Ho Steverino. The unique STEVE ALLEN is RTC guest on.....SHOWBIZ
 7. Meet the GEnie Programming Staff Sat. Aug. 3, 9:00pm EDT in..GENIEUS
 8. Win Prizes in the Star Wars Trivia Test, in..................SFRT
 9. Celebrate Deutschland RT's final birthday bash, PRIZES.......*GERMANY
10. WIN a free copy of SWOTL......................................SCORPIA
11. Police + Fire = EXCITEMENT Scanner listening RTC 8/4 9PM.....RADIO
12. RTC 8/4-Dr.Lant: Marketing Your Way Out of the Recession.....HOSB
13. Win 30 days of Free Time with your short stories in..........MPGRT
14. Test Your Knowledge with Trivia.  Free RTC Plus Prizes.......REAL ESTATE
15. The "BIG BOOK" is here.......................................SEARS

Enter #, <H>elp, or <CR> to continue?
```

***Crosstalk for Windows 1.2* from DCA**

Command-driven software displays no menus; rather, you issue commands on what is called a command or status line, or press a combination of keys (usually including the Ctrl or Alt keys) or special designated keys (such as the function keys).

A number of communications programs are both menu and command driven. This is the most efficient setup if you're new to telecomputing. ❑

HOW TO CHOOSE AN ONLINE SERVICE

MICHAEL A. BANKS

Perhaps you're new to online communications. Or maybe you've only used your modem to call your local BBS. Now that you've gotten your feet wet, you're probably wondering what the online services—such as CompuServe, GEnie, Prodigy, and America Online—are all about.

An online service provides modem users with a variety of information, entertainment, education, and communication services. In most American cities, you can dial these services directly or through a third-party network (such as Tymnet).

Variety Pack

All these systems offer a mix of E-mail, databases of one type or another, special-interest groups, message bases, and realtime conferences. In addition, most of the consumer services offer some or all of the following:

- News and weather. These services include regional, national, and international news; weather by city, state, or region; and specialized news such as sports and financial news. The news is from the same sources that other media use—newswires and syndicates.
- Financial information and services. Stock and commodity quotes, market reports, and brokerage services are offered online by many of the big-name investment companies. Some systems can automatically update your portfolio.
- Entertainment. Online entertainment is very popular. There are single- and multiplayer games, played realtime or via postings in message bases. Most online games mirror the disk-based computer games, so you'll find a lot of role-playing and adventure games. You'll also find arcade games (most of these require special software or terminal emulation).

- Reference and education. Online encyclopedias head the list here. You can find products such as *Grolier's Academic American Encyclopedia* and *Compton's Encyclopedia* on just about every service. A variety of other references are also available, ranging from *Marquis Who's Who* to the *Magazine Index*. Education services include the *College Board* and *Peterson's College Guide*, as well as online tutoring, study, and degree programs.
- Special-interest groups (SIGs). These are the heart of many online services. Known variously as Forums, RoundTables, and conferences, SIGs host a variety of services, including message bases, databases, upload/download services, and online advertising and sales.
- Travel services. This usually takes the form of travel information that's sponsored by a carrier, destination, or travel agency.
- Shopping and online product support. Online shopping is just now coming into its own. Although specialty retailers and computer and software discount operations have enjoyed some success online over the years, it's taken the presence of major national retailers such as Waldenbooks and Sears to legitimize online shopping. Online product support—almost exclusively for computers and software—has been fairly well received, although there seems to be competition among online services to be the only host for some companies' online product support.
- Specialized news and database services. As you might expect, there are a number of computer news services and columns online. Some are unofficial products in the form of special-interest newsletters, such as "PC Review Online." These are usually found in the public database areas. Others are official products, such as Charles Bowen's "A Networker's Journal" on CompuServe and GEnie, that are presented in their own areas or as menu selections. Specialized newsletters that have nothing to do with computing are also showing up. Among these you'll find newsletters for occupations such as writing, public relations, and advertising.
- Full-text versions of magazines and newsletters. Selected computer magazine articles and program listings have been popping up within SIGs for some time, but it's only since the late 1980s that the complete contents of computer magazines have been online. Online versions of noncomputer magazines, such as *National Geographic*, are much less common. ❑

ONLINE SERVICE SAMPLER

MICHAEL A. BANKS

America Online

Introduced in October 1989, America Online (AOL) uses a graphical user interface based on *GeoWorks Ensemble,* complete with icons and pull-down menus.

America Online features a sophisticated E-mail system that lets you review messages you've already read, copy them to disk, attach files to messages, and check to see whether a message has been read. A systemwide member directory lets you see where a member is from and read the member's profile (if he or she has entered one).

Special-interest groups, called Forums, provide message bases and realtime conference areas. The conference areas are referred to as rooms and auditoriums. AOL's Forums cover specific computing, hardware, and software interests, as well as hobby, lifestyle, and personal interests that range from science fiction to veterans' concerns.

You can download files from the individual Forums or from a central area. AOL uses a proprietary binary file-transfer protocol.

The ability to search for software from within a central area makes it easy to find files. You can specify any combination of categories, range of time, or keywords. The search facilities in the message bases are similarly well designed.

Among AOL's other highlights are national news, weather, and sports; stock quotes; travel services such as Eaasy Sabre; shopping with Comp-U-Store online and other vendors; computing and consumer news features and columns; and access to *Grolier's Academic American Encyclopedia.*

Online gaming is popular on AOL. There are several play-by-mail games and single-player games. Of particular interest is *Rabbit Jack's Casino,* which lets you play blackjack, bingo, and other games in realtime with other players or against the house.

AOL's rates are $5.00 an hour during nonprime time and $8.00 an hour during prime time, with a $5.95 minimum charge each month. (The minimum charge includes one hour of connect time.) You can contact America Online at (800) 227-6364.

BIX

BIX is an acronym for *Byte Information eXchange*. Established in 1985, BIX uses the UNIX-based COSY computer-conferencing system. (That's computer conferencing in the traditional sense of the term—meaning conferencing via message bases, not realtime conferencing.)

BIX has four main services: computer conferencing, electronic mail, realtime conferences, and software/file databases. An area called options lets you set up and change how BIX communicates with you. In addition, you can create an online résumé with information about yourself that other users can access from most prompts by typing *show resume <username>*.

The heart of BIX is its computer-conferencing system. The system is based on a series of message-base subject areas called conferences, each of which is a part of a group of related conferences. BIX currently hosts over 200 conferences. Individual conferences are further organized into topics that are appropriate for the conference subject.

The conference system is fairly sophisticated. In addition to letting you read, scan, post, reply to, and search for messages, BIX allows you to locate and follow message threads, and much more. You can participate in (join) as many or as few BIX conferences as you like. And you can select specific topics within a conference to participate in. (A few conferences are closed, which means that you must ask or be invited to join them.)

BIX's CBix realtime conferencing system is a fairly easy-to-use multiband, multichannel CB simulator. Features include whispers and handles. The system makes interesting use of specific terminal features. If your software can emulate a VT-100 or any of a dozen or so other terminals, you can take advantage of screen clearing, a chat window, a window for whispers, and other special features.

You can find downloads of all types in special BIX areas called listings. ASCII, Kermit, XMODEM, XMODEM/CRC, YMODEM, and ZMODEM protocols are available for file transfer. (Billing is automatically turned off when you upload a file.)

BIX gives users their choice of per-minute billing or a flat rate. The flat rate is $39 each quarter for unlimited access to BIX, 24 hours a day. The hourly rate is $4, 24 hours a day, with an annual subscription fee of $59. Neither plan includes the costs for access via a packet-switching network, such as Tymnet or BIXnet. You can contact BIX at (800) 227-2983.

CompuServe

CompuServe is one of the world's largest public online services. It was also one of the first commercial online services to cater to computer hobbyists. Established in 1979, CompuServe today has more than 750,000 subscribers.

The TOP menu is like the tip of an iceberg. While it shows in general what's there, there's much more than the TOP menu even implies. Literally hundreds of services exist on CompuServe—among them some extremely useful areas dealing with electronic communications. Beyond this menu lie general and specialized news and information services; special-interest groups (called Forums) for computer users, professionals, hobbyists, and others; online games and other entertainment; sophisticated research services; a free online tutorial; and more.

You'll find the standard newswires, including AP, UPI, and Reuters, as well as more exotic services, such as TASS. There's also a clipping service that delivers news stories to your E-mail box, based on the keywords that you specify.

CompuServe is particularly strong in online research facilities, among them *Grolier's Academic American Encyclopedia* and gateways to Dow Jones News/Retrieval Service and several specialized services—including IQuest, a collection of more than 700 specialized research databases.

The Forums feature sophisticated message bases, a reasonable database system, and realtime conferencing that's separate from the system's CB Simulator.

Also of interest are CompuServe Mail's two-way gateways to MCI Mail and Internet. CompuServe Mail can handle outgoing fax and telex messages, as well as paper mail. You can also use CompuServe Mail to transfer files to other CompuServe users.

File-transfer options in Forum databases, E-mail, and certain product areas include ASCII, XMODEM, XMODEM/CRC, CompuServe's own B and B+ protocols, and others.

CompuServe's basic rates are $5.00 an hour at 300 bps and $12.80 an hour at 1200 or 2400 bps, through CompuServe's own network, 24 hours a day. There are additional charges for higher speeds and for access through other networks. Various optional service plans are available, and gateways and certain other services have surcharges.

As of this writing, CompuServe is testing a plan whereby a specific group of monthly services is made available for $7.95 a month. You can contact CompuServe at (800) 848-8199.

DELPHI

Established in 1982 as an online encyclopedia (the first of its kind), DELPHI has evolved into a full-service network, providing products and services of all types. It's an especially friendly system with a real sense of community and a good place to meet others who share your interests.

Like CompuServe's TOP menu, DELPHI's Main Menu is just the tip of the iceberg. DELPHI offers a variety of news and information services, online entertainment, special-interest groups, two online encyclopedias (*Grolier's* and the original *Kussmaul Encyclopedia*), a unique gateway to the DIALOG information service, and more.

DELPHI's special-interest groups are noteworthy for the BBS-style communication facilities they provide and for the software and information that are available to download. The SIG message bases are extremely sophisticated, letting you find messages based on almost any criteria imaginable, including content. The SIG database structure is equally sophisticated and lets you use multiple keywords to narrow or widen your searches.

Also of note on DELPHI are the weekly online realtime poker and trivia tournaments, a scrambled word game, and games that take advantage of VT-100 terminal emulation.

You get a personal online storage area, called Workspace, which you can use to store your files or to transfer your documents for E-mailing. File-transfer options in Workspace, SIG databases, and certain other areas include ASCII, Kermit, XMODEM, XMODEM/CRC, YMODEM, YMODEM/Batch, and ZMODEM.

Of all the E-mail systems offered by consumer online services, DELPHI's is the most powerful yet easiest to use (once you learn it). Not only can DELPHI members send fax and telex messages, but they can also receive incoming telex messages free of charge beyond normal connect-time charges.

The basic plan costs $6.00 an hour during nonprime time, with a $5.95 a month minimum (this covers your first hour online). DELPHI's 20/20 plan costs $20.00 a month, for 20 hours of nonprime-time access. Under this plan, additional time costs only $1.20 an hour. The 20/20 plan is available only for those who access DELPHI through Tymnet and includes the Tymnet charges. Unlike the flat-rate or alternative plans offered by some services, the 20/20 plan covers the entire service. A few areas, such as DELPHI's link to DIALOG, require a surcharge no matter which plan you use. There's also a $39.00 sign-up charge. You can contact DELPHI at (800) 544-4005.

GEnie

Established in 1985, GEnie is the fastest-growing service of its kind. It enjoys a tremendous growth rate, thanks to its variety of services, aggressive advertising, and friendly price structure.

GEnie offers the same categories of services as CompuServe and DELPHI. News, weather, sports, and travel information are particularly strong areas for GEnie, as are its versions of special-interest groups, called RoundTables.

The RoundTables are fairly easy to use, even though the message bases aren't very sophisticated and you can't specify more than one keyword when you search a RoundTable's software library.

Online research facilities include *Grolier's Academic American Encyclopedia* and a gateway to Dow Jones News/Retrieval Service. GEnie's news offerings include searchable headline news and columns by a number of well-known writers in the computer field. There's also a clipping service that delivers news stories of interest to your E-mail box, based on the keywords you specify.

With GE Mail—GEnie's E-mail service—you can send letters to and receive them from other GEnie users, and send paper mail and fax messages. GEnie offers a unique option by which a GEnie user can have his or her own telex number for an extra fee. While GEnie has no personal file system as such, you can upload messages to send to other GEnie users via a special utility. GEnie's mail address file features a flexible search system that you can use to find both GE Mail addresses and the names of people online.

In addition to trivia, parlor, sports, role-playing, and single-player adventure games, GEnie has some very attractive realtime multiplayer action games. In particular, *Air Warrior* has attracted a large and extremely devoted following.

GEnie offers 300/1200/2400 baud access through its own national network of direct-dial local numbers in several hundred U.S. cities. It also has an increasing number of 9600-bps and V.32 nodes, and even some V.42 nodes.

For just $4.95 a month, you can have unlimited nonprime-time use of E-mail, news, and other selected services. GEnie charges $0.10 a minute during nonprime time for services that aren't included in the flat-rate plan (including the RoundTable software libraries and realtime conferencing). The prime-time rate is $18.00 per hour with a surcharge for 9600-bps access.

Certain products, such as GEnie's gateway to Dow Jones News/Retrieval Service, cost extra. You can contact GEnie at (800) 638-9636.

Prodigy

This high-resolution graphics-based service is very different from the other consumer services in both how it's set up and what it offers. If you're a software junkie looking for downloads or you're a realtime conference maven, you won't find those things here. But Prodigy has virtually all the other trappings of a full-service consumer service. And you'll find some unique offerings among its more than 750 products and services.

Prodigy is a partnership of IBM and Sears that's intended to be a simple yet powerful online service for the general consumer market. Given its goals, Prodigy has done a good job in reaching its intended audience—those with computers who aren't technically oriented.

E-mail, news, weather, and travel information head the list of Prodigy offerings. Reading news on Prodigy is a lot like reading a newspaper; you can select news to read by headlines and jump to other articles whenever you wish. Like a newspaper, Prodigy offers pictures and charts—in the form of color graphics—along with the news.

Several nationally known magazines are Prodigy service providers. Among them is *National Geographic,* which provides an especially attractive and enlightening excerpt each month. You'll also find *Billboard* music charts, *Changing Times* magazine, and magazines for young adults and children (including *Weekly Reader*).

Online gaming is also graphics intensive. Graphics-based games include *Police Artist* (a game that challenges children to combine different elements of faces to match a suspect's picture) and *MadMaze* (a role-playing/adventure game). There's even an online W*here in the World Is Carmen Sandiego?* with a new adventure each week.

Grolier's Academic American Encyclopedia heads the list of reference resources on Prodigy, which also includes columns and clubs on a variety of home, special-interest, and business topics, as well as information from computing and general-interest magazines.

Prodigy costs $12.95 a month for unlimited access, day or night. You can have as many as six IDs per household—so you are, in effect, getting six accounts for the price of one. Prodigy's 6-, 12-, and 24-month memberships are available for $65.70, $119.40, and $199.95, respectively.

Startup kits are sold for $39.95 at Sears and computer stores nationwide. However, Prodigy runs constant promotions in which the software is given away, along with a month's free trial. You can contact Prodigy at (800) 822-6922. ❑

ONLINE COMMUNICATIONS GLOSSARY

baud rate A measure of the speed that a modem can send and receive data—specifically, the number of events, or signal changes, that can occur each second. Because an event can contain more than one bit, a modem's baud rate and bps are not always the same. See also **bps.**

bps (bits per second) A measure of the speed that a modem can send and receive data—specifically, the number of bits that can be transferred each second. Often confused with baud rate. See also **baud rate.**

download The process of receiving a file by modem. See also **upload.**

duplex Communication that occurs in both directions at the same time between two computers. One-way communication is called simplex, and two-way communication taking place in only one direction at a time is called half-duplex.

E-mail (electronic mail)The transmission of messages from one computer to another by way of an electronic network. This network can be either a local area network (LAN) or a larger communications network, such as CompuServe or GEnie.

MNP (Micom Network Protocol) A set of error-correction and data-compression standards that was developed by Micom and made available to other modem manufacturers.

modem (modulator/demodulator) A device that allows a computer to send information over a standard telephone line.

parity An extra bit that a modem sends with each character to check the accuracy of that character. Common types of parity are even parity, odd parity, no parity, space parity, and mark parity.

stop bit The bit that signals the end of a character during an online transmission. The data bits that make up a character are usually followed by 1, 1.5, or 2 stop bits.

upload The process of sending a file by modem. See also **download.**

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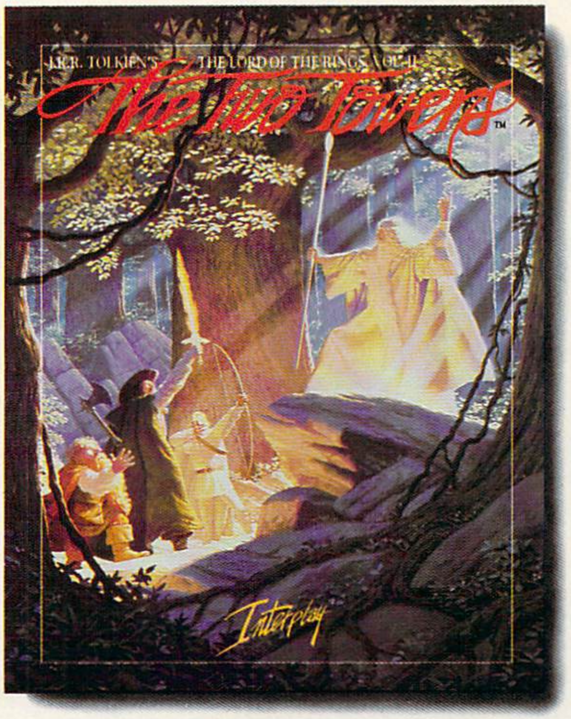

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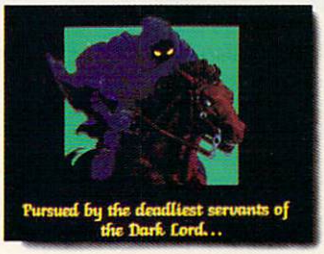

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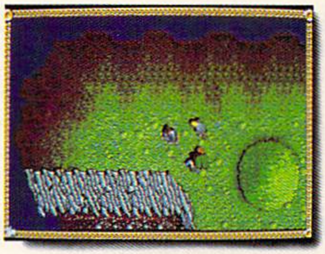

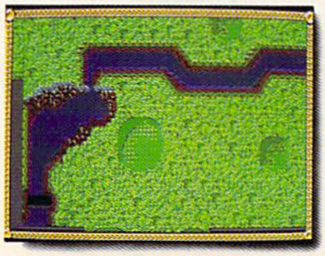

MS-DOS Screens Pictured.

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COMPUTE

VOLUME 13, NO. 10, ISSUE 134 OCTOBER 1991

6
EDITORIAL LICENSE
By Peter Scisco
Americans embrace technology even as they debate its effects.

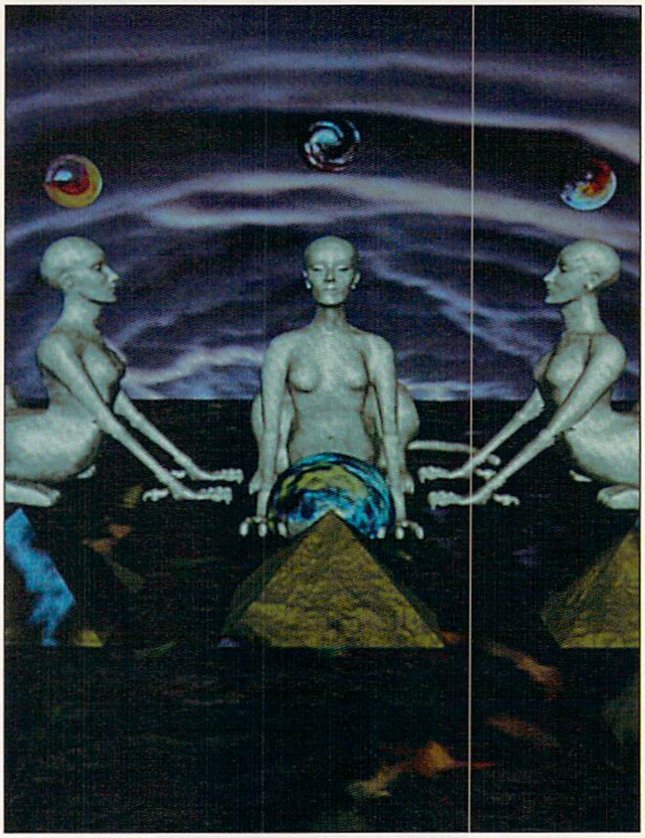
8
NEWS & NOTES
By Alan R. Bechtold
Arcade 3-D, voice control for PCs, a real editor, and more notes on the news.

14
FEEDBACK
Legal copies, cheers and jeers, how to park, bad clusters, and more reader mail.

18
THE STATE OF COMPUTING: U.S.A.
By Gregg Keizer
They're everywhere. Computers have altered the American home and office more than any other appliance.

28
SHAREPAK
By Richard C. Leinecker
This month's disk brings voice capability, 3-D designs, world conquest, and chess to your PC.

30
TEST LAB: 386SX DESKTOP SYSTEMS
This month we take on ten hot SX machines.



The artwork on our October cover, An Egyptian Dream, *was created by Marcel Achard at STUDIOS TAARNA. A computer artist since 1985, Achard used a software package called* Taarna. *The result provokes images of modern mystery and ancient history against a dark desert landscape.*

44
VIRUSES FROM A TO Z
By Mark Minasi
Computer viruses. Mysterious and malevolent. Be prepared for any contingency.

50
ON DISK
By Tony Roberts
VIRUSCAN, Useful Notes, Directory Size, Big Desk, and *Mr. Filter* help your PC.

52
POINT & CLICK
By Clifton Karnes
GeoWorks Ensemble is here.

54
BUYER'S GUIDE TO VIRUS PROTECTION SOFTWARE
By Chantelle Oligschlaeger and Erin Richter
Here's protection.

61
INTRODOS
By Tony Roberts
Create macros.

62
PROGRAMMING POWER
By Tom Campbell
When speed is essential, assembly language is your ticket to ride.

66
TIPS & TOOLS
Speed up DOS, conserve your handles, and operate *QuickBASIC* rodent-free.

68
HARDWARE CLINIC
By Mark Minasi
Choose a hard drive.

73
ONLINE
By Denny Atkin
Reach out and play someone.

74
PC TOOLS 7.0
By Tony Roberts
Despite bug reports, it's still a topflight hard disk utility.

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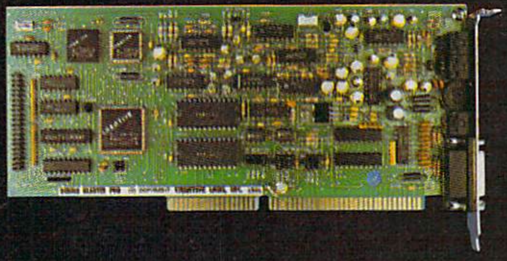

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Jerry Pournelle, BYTE June 1991

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The built-in mixer makes the Sound Blaster Pro fully compliant with Microsoft's Multimedia Level 1 Extensions to *Windows*. Multimedia software will be able to fade-in, fade-out and pan the various audio sources to create elaborate sound montages.

The Sound Blaster Pro includes a CD-ROM interface for either an internal or external CD-ROM player. There's also an internal connector for CD-Audio. The MIDI interface is compatible with the original Sound Blaster's MIDI interface but adds the MIDI time-stamp that's part of Microsoft's new multimedia standard.

All in all, the Sound Blaster Pro is chock-full of new features, yet it's fully compatible with its younger brother."

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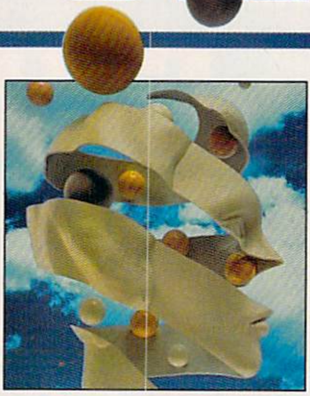
76
WORKPLACE
By Daniel Janal
Showing up
at work is just fine—
as long as you
can do it without leaving
your house.

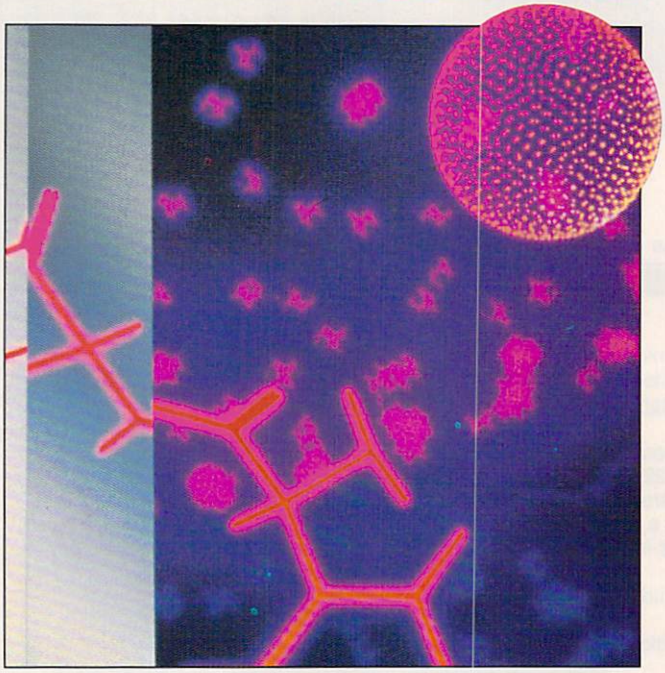
78
REMOTE POSSIBILITIES
By Rosalind Resnick
More and more employees
are working for
the company from
home offices.
Here's how to get
telecommuting to work
for you.
And how to convince
your bosses
that it will work for them.

84
ARTS & LETTERS
By Robert Bixby
Get the adventure
out of *Ventura Publisher*
with some clever
supporting products.

86
WHERE IN AMERICA'S PAST IS CARMEN SANDIEGO?
By Clayton Walnum
Working proof
of an age-old adage—
you just can't
keep a bad woman down.

97
PATHWAYS
By Steven Anzovin
The whole idea
of virtual reality has
given birth
to a staggering amount
of verbal goulash.





160
CONVERSATIONS
What a long, strange
trip it's been.
Dr. Timothy Leary discusses
mind expansion
during the computer age.

98
TURN A HOME SWEET HOME INTO A SMART HOUSE
By Howard Millman
This step-by-step guide
turns that old
XT into a home sentry.

104
FAST FORWARD
By David English
Hot 'Lanta dances to the
wild 'n' funky *Windows*
multimedia beat.

106
LEMMINGS
By David Sears
Run yourself crazy with
this invigorating
mental cliff jumper.

108
GAMEPLAY
By Orson Scott Card
If Prodigy gets it right,
its name is Legion.

110
SPECIAL REPORT
By Tom Netsel and
Peter Scisco
From ants to tanks,
from outer space to inner
sanctums,
this summer's
Consumer Electronics Show
had a little
something for everyone.

121
REVIEWS
Sneak peeks
at *Headline Harry and the
Great Paper Race*
and *Elvira II: The Jaws
of Cerberus*.
Also, more product reviews.

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EDITORIAL LICENSE

Peter Scisco

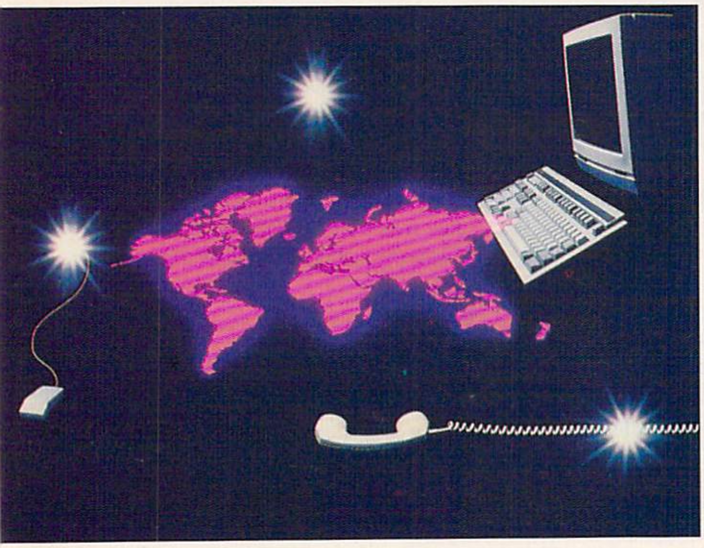
You've got a high-maintenance, high-tech rep that precedes you to every neighborhood cocktail party and backyard cookout. Hardly a night passes without your getting a call from a friend of a friend seeking advice about hardware or asking recommendations about good software for kids. You're known around the office as the resident PC troubleshooter, though the title never appears in your job description.

On the day you bought your PC and brought it home, you strapped yourself to a superoctane booster on a high-tech shuttle into the nether regions of information overload. The rarefied atmospherics of this newfound land have propelled you into frenzied, late-night flights across a galaxy of 0s and 1s.

On each successive voyage you get closer to the rim. Each trip into the digital night finds you flirting with full-throttle burnout that threatens to fling brain waves and electrons willy-nilly across the entire technospectrum.

You remember what it was like at first. After a few weeks, you had learned a little about batch files. You started writing a few of your own. You rewrote AUTOEXEC.BAT, and then you swung your sights onto CONFIG.SYS.

From the cotton gin to the computer, Americans have embraced technology's benefits even as they have debated its effects.



A couple of months later, that wasn't enough. You started to read all you could about PCs. You bought some software to optimize your hard disk. You bought a new word processor. You talked your boss into buying a copy of the spreadsheet program you use in the office so you could work at home.

A couple of months have passed. You've become an expert at using every XCOPY switch. But you're getting tired of lugging those floppies back and forth to work. You suspect that any day your data will self-destruct—the latest versions of the company budget will evaporate into a cloud of dissipated electrons. Anxiety begins to dull your technological edge. You start looking around for answers.

What you see are more computers. Your world is built of systems. Chips control your car's engine and your microwave oven. Your inexpensive pocket data card operates within a frame of silicon. Words like *bandwidth, crash, virus,* and *interface* creep into your speech. At home, your kids are running up tremendous bills on a cordless phone. Back in the city, lunch is served while conversations are channeled, corpuscular infobits navigating the net like synapses fired into the cerebral cortex.

Welcome to America. Technology is much more than a thread in the fabric of our late-twentieth-century society. It's irrevocably bound up with the way we see ourselves and our place in the world. Our history is a story of progress and setbacks underscored by a practically unwavering belief in the machines we have created. From the cotton gin to the computer, Americans have embraced technology's benefits even as they have debated its effects.

The advent of the personal computer has furthered this uneasy alliance by placing powerful technological tools in the hands of individual citizens. The air fairly teems with ideas for new computing devices of every imaginable purpose.

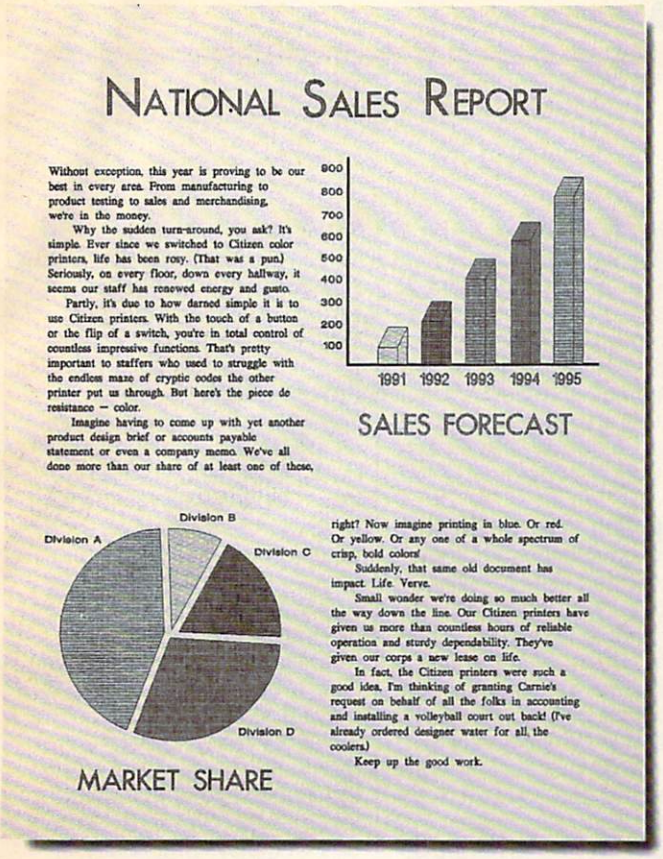
This month, we examine some of those advances and the implications of the new technology in "The State of Computing: U.S.A." Writer Gregg Keizer looks at the rise of invisible machines, the advent of pen-based computing, and the roles computers play at work, at school, and in play. He explores the trend toward more powerful, less expensive computer systems that are beginning to fill American households. And he takes a hard look at why so many Americans have yet to open their homes to the personal computer.

For those of us who have adopted the newest in technology, it's sometimes amazing that more of our neighbors go without. Sometimes it's a matter of economics. Sometimes it's a matter of computerphobia. Sometimes it's a simple matter of priorities—why spend $1,500 on a computer to balance a checkbook?

PCs are still underused, relegated to the role of fancy calculators and muscle-bound typewriters.

While it's not up to consumers to define what's needed, technologically, to enhance the quality of our lives, we can help by spreading the power of computing to our friends, relatives, and neighbors.

What can you do to further the cause of computing in America? Invite some folks over to see what the fuss is all about. After all, your reputation is at stake. ❐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Division D

NATIONAL SALES REPORT

Without exception, this year is proving to be our best in every area. From manufacturing to product testing to sales and merchandising, we're in the money.

Why the sudden turn-around, you ask? It's simple. Ever since we switched to Citizen color printers, life has been rosy. (That was a pun.) Seriously, on every floor, down every hallway, it seems our staff has renewed energy and gusto.

Partly, it's due to how darned simple it is to use Citizen printers. With the touch of a button or the flip of a switch, you're in total control of countless impressive functions. That's pretty important to staffers who used to struggle with the endless maze of cryptic codes the other printer put us through. But here's the piece de resistance – color.

Imagine having to come up with yet another product design brief or accounts payable statement or even a company memo. We've all done more than our share of at least one of these, right? Now imagine printing in blue. Or red. Or yellow. Or any one of a whole spectrum of crisp, bold colors!

Suddenly, that same old document has impact. Life. Verve.

Small wonder we're doing so much better all the way down the line. Our Citizen printers have given us more than countless hours of reliable operation and sturdy dependability. They've given our corps a new lease on life.

In fact, the Citizen printers were such a good idea, I'm thinking of granting Carnie's request on behalf of all the folks in accounting and installing a volleyball court out back! (I've already ordered designer water for all the coolers.)

Keep up the good work.

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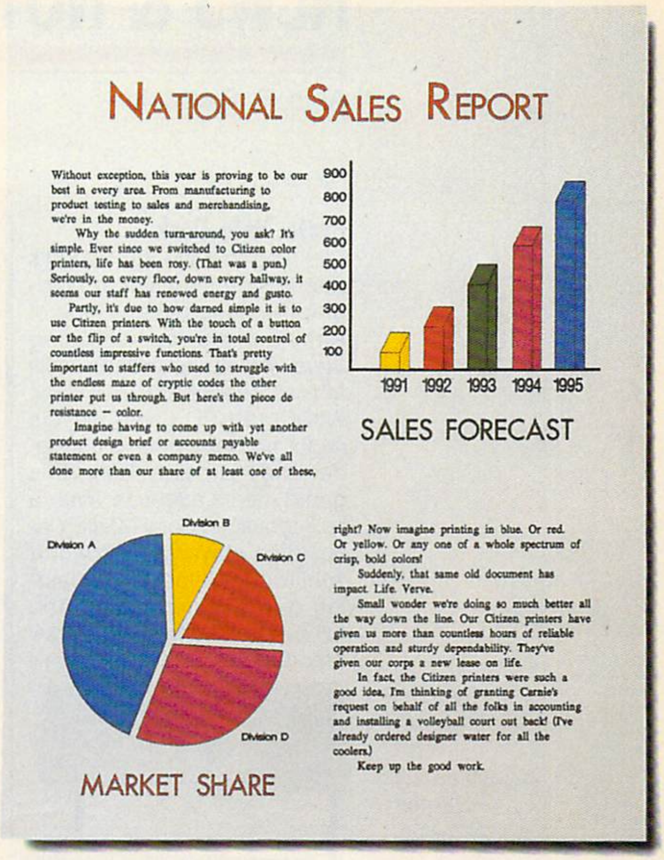
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Keep up the good work.

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**YOUR SOFTWARE.
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CITIZEN™

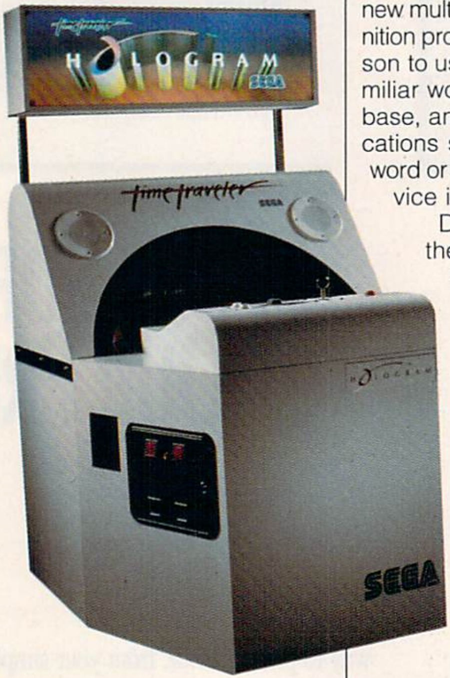
Circle Reader Service Number 166

NEWS & NOTES

Alan R. Bechtold

Proto Holo Deck

Claiming to have the "world's first three-dimensional holographic videogame," Sega of America started shipping *Time Traveler* to arcade halls across the country in July. While most PC game players might not take note of the local mall arcade hall, this game merits attention. With a self-contained Sony 12-inch laser disc player and 20-inch Trinitron monitor, and boasting digital stereo sound and full digital graphics, *Time Traveler* may be as close as we'll ever get to an interactive 3-D entertainment environment in this decade (unless virtual reality really takes off).



Save the holographic universe in Sega's Time Traveler arcade game.

The game itself is straight game hall action—a rowdy shoot-'em-up that requires you to traverse time and battle renegade scientists, ninja warriors, streetwise punks, cowboys, cave dwellers, and every other brand of adversary imaginable to modern arcade game wizards in an attempt to (what else?) save the universe.

Time Traveler should be in your local arcade hall by now, if you're curious. It costs 75 cents a pop, and you can buy more time cubes to keep you alive and kicking—sort of an interactive wallet. A roll of quarters and a willing suspension of disbelief should buy you a couple centuries of fun.

Computing sans Keyboard

A new personal computer accessory can literally bring the world to those who are physically unable to operate a keyboard. IBM's VoiceType is a new multimedia speech recognition product that allows a person to use DOS along with familiar word processing, database, and spreadsheet applications simply by speaking a word or command into the device instead of typing it.

Developed jointly by the IBM Special Needs Systems group and Dragon Systems, VoiceType adjusts to each user's individual speech patterns and language usage and, once it recognizes a user's unique pronunciations, stores them for future speech recognition. The product is intended primarily for those who are unable to use a keyboard, but anyone can use it as a keyboard alternative—especially if price isn't an issue with the user.

VoiceType uses IBM's M-Audio Capture and Playback Adapter and is supported on IBM PS/2 386 and 486 systems that run 16 MHz or faster. It comes with a user's guide, training videotape, online reference guide, programs on 3½-inch disks, and a headset microphone. The product is available through Dragon Systems for $3,185.

For more information on VoiceType, contact Dragon Systems at 320 Nevada Street, Newton, Massachusetts 02160; (800) 825-5897.

Power Editing

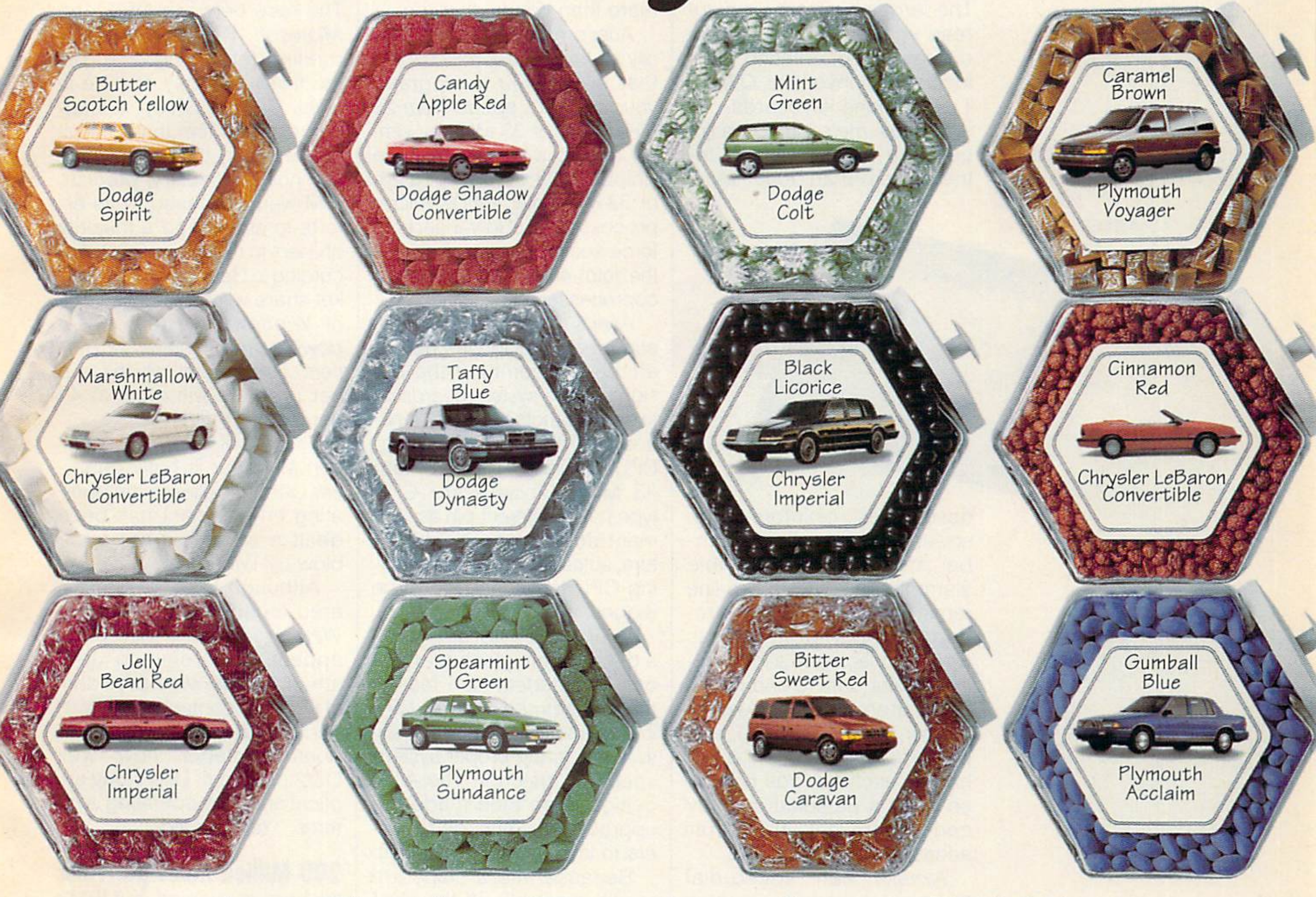
You've heard of power lunches, power brokers, and power deals. Now there's power editing. Good writers know their best work requires a second pair of eyes to double-check—at the very least—for grammar, spelling, and those inevitable typing errors.

Artificial Linguistics says its new program, *PowerEdit*, is the first software product to *intelligently* read, manage, and manipulate text. To perform the functions of a human editor and proofreader, *PowerEdit* employs proprietary artificial-intelligence technology—a text engine—that produces a quantifiable database it uses to intelligently manipulate text. It finds and corrects problems associated with business writing—lack of clarity, wordiness, ambiguity, and incorrect grammar.

PowerEdit's text engine recognizes more than 1 million words and their usages and applies 200,000 rules of good writing to your writing. It works directly with word processing software, recommending changes to make writing powerful, clear, precise, and correct. Artificial Linguistics president Doug Kramp says the company plans to eventually license the text engine to software publishers for other applications needing intelligent text manipulation, making it a type of operating system or environment in which word processors and other software programs can run. The program sells for $295.

For more information about *PowerEdit*, contact Artificial Linguistics, 2301 North Akard, Suite 200, Dallas, Texas 75201; (800) 800-4254.

It's Like Being A Kid In A Candy Store.



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NEWS & NOTES

Touch Axxess

New from Oregon Scientific is Axxess, a small, lightweight LCD touchscreen that allows you to quickly and easily store and retrieve information. The large-character, easy-to-read screen features numerous layouts for entering data, including convenient QWERTY and alpha keyboards.

Touch the Axxess screen to speed-dial a phone number.

With the mere touch of a finger, you can store and retrieve more than 1000 "business cards" of information, speed-dial any phone number stored, set an audible alarm that displays a two-line reminder message, print reports directly from Axxess when connected to a PC printer, transfer data to and from a PC or from another Axxess unit for memory backup, and perform numerous other handy functions. You can also enter a personal security code to prevent others from accessing your machine.

Axxess can speed-dial from most phone systems and print from most printers, so with the 3½-hour battery supply included, it's especially useful for business travelers. Axxess is priced at $599.

For more information about Axxess, contact Oregon Scientific, 10950 SW 5th Street, Suite 275, Beaverton, Oregon 97005; (503) 646-9806.

Single Does It

Upgrading a personal computer by simply plugging in a single chip would certainly make life easier for some of us, considering how fast computer technology changes. Thanks to Acer America's new ChipUp Technology, single-chip upgrades are now more than wishful thinking.

Acer's new system is actually an Intel 486SX-based CPU that allows you to upgrade your system's speed from 20 MHz to 25 or 33 MHz by simply adding a single chip. The ChipUp CPU will accept a 25- or 33-MHz Intel 486DX microprocessor in a low-insertion-force socket that also accepts the Intel 487SX 20-MHz math coprocessor.

Acer's first challenge in creating the ChipUp was how to effectively combine the design of three system boards into a single motherboard—a necessity for accommodating CPUs running at 20, 25, and 33 MHz. Since every CPU type has a different pin assignment and internal architecture, autoswitching and detecting CPU frequency were the biggest design hurdles.

Acer ended up designing a dynamic architecture with a built-in autodetection feature that senses the type of CPU in use and then automatically switches to the proper system speed to match it. The Acer design team then made the upgrade easy enough for users to implement themselves.

Because Intel's chips are readily available off the shelf from component dealers worldwide, Acer's new system gives those wanting to upgrade the opportunity to shop around for the best-priced chips available. Since the specially designed sockets allow users to easily insert the Intel chip of their choice, both users and dealers have an easy way to upgrade systems on their own without technical help. Suggested retail price for the ChipUp is $2,745.

For more information, contact Acer America, 401 Charcot Avenue, San Jose, California 95131; (408) 922-0333.

Is OS/2 Losing?

The race between OS/2 and *Microsoft Windows* has been running for a long time, but the finish line may now be in sight. Gartner Group, a leading research firm that analyzes trends in the information technology industry, predicts IBM won't succeed in its efforts to encourage a majority of users to migrate to OS/2. According to Gartner, OS/2's market share will be only half that of *Windows* by 1995. *Windows* currently holds 12 percent of the market, which Gartner predicts will grow to 41 percent by that time.

The fate of OS/2's *Presentation Manager* is hotly debated. Gartner believes the operating environment has been dealt a severe, if not fatal, blow by *Windows.*

Although OS/2 is considered technically superior to *Windows,* it lacks third-party appeal, according to Jonathan Yarmis, vice president of personal computing at Gartner. "Without that appeal, it doesn't matter how well OS/2 performs. Users buy applications, not operating systems," Yarmis said.

200 Million Miles per Hour

It's hard to imagine, but IBM's newest multichip package is actually capable of speeding electric impulses between computer chips at the rate of 280 million miles per hour. The record-breaking package, which holds 121 silicon chips inside a densely packed ceramic module, is currently in production as part of IBM's new System/390 series of large computers.

To take advantage of the increasing speed of computer chips, computer architects

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must design equally speedy connections between chips. In IBM's new package, 121 chips are tightly packaged just three-eighths of an inch from each other, which is an industry record.

The chips are mounted directly on a new IBM material called glass ceramic, which effectively transmits signals from one chip to another. They're connected by tiny wires made of copper, an excellent conductor of electricity. The package resembles a multilayered sandwich.

Although the new IBM chip package isn't intended for use in microcomputers, once the technology is tried and true, it could eventually trickle down to the PC platform.

Thanks to Microsoft Windows, BASIC has more than one life to live.

Still Alive and Kicking

The advent of *Microsoft Windows* actually breathed new life into BASIC. Visual Basic for *Windows* 3.0 is the latest version of the long-lived, popular programming language. It's a graphical application development system for *Microsoft Windows* 3.0 that combines visual-design tools with a powerful general-purpose programming language and *Windows'* EXE compiler.

Bill Gates, Microsoft founder and chief executive officer, forecasts that many thousands of *Windows* applications will be written in Visual Basic. Forty-five independent software developers have already announced and demonstrated more than 60 such products, ranging from custom controls to add-on DLLs for data access and multimedia applications.

Visual Basic for *Windows* is now available in the U.S. for $199. Microsoft already started shipment of German and French versions and has also scheduled other language versions to follow.

For more information, contact Microsoft, One Microsoft Way, Redmond, Washington 98052-6399; (800) 426-9400.

Shooting for a Longer Run

Running out of battery power in the middle of a laptop computing session can be frustrating. It can even wipe out the bountiful benefits of using a portable computer in the first place, which is why so many companies are diligently trying to come up with anything that will extend battery life for portable, laptop, and notebook PCs.

Appian Technology's PowerMizer is a new Power Manager Controller chip for laptop and notebook PCs that goes a long way toward achieving the long-life goal. The new chip controls circuits and peripherals during system operation, working in conjunction with Appian's System 90/SX local-bus–based 386SX chip set. Already available to manufacturers, the new chip should start showing up in laptop and notebook PCs soon.

For more information about the PowerMizer, contact Appian Technology, 477 Mathilda Avenue, Sunnyvale, California 94086; (408) 730-8800.

Not Just Nintendo

Super Mario, Princess Zelda, Link, and Donkey Kong. For the first time, these popular Nintendo characters will be hitting home television screens on a video system other than Nintendo. They'll be seen on Compact Disc Interactive (CD-I), a new multimedia technology Magnavox has planned for release this year. Nintendo of America and American Interactive Media (AIM) reached an agreement that will permit AIM to develop and market CD-I titles featuring the popular Nintendo characters.

AIM is the principal developer of software programs for CD-I systems planned for sale through consumer electronics stores this fall. The Nintendo characters will join such familiar names as Time-Life, Rand McNally, the Smithsonian Institute, ABC Sports, Richard Scarry (of children's book fame), and others who have copublished software through AIM for use on CD-I systems. Other popular children's characters to be available on CD-I software are Big Bird, Elmo, Bert, and Ernie from "Sesame Street," who appear in Children's Television Workshop programs developed for the new system.

For more information on this software, contact American Interactive Media, 11111 Santa Monica Boulevard, Suite 700, Los Angeles, California 90025; (213) 473-4136.

FAX on the Go

Those eleventh-hour rushes to the fax machine only to wait in line for a leisurely transmission may soon become office history now that Ibis has developed a new software program which lets you send faxes with a modem.

On the GoFAX can transmit a one-page document in 20 to 30 seconds—from your computer. If the number you're calling is busy, AT&T's Service Bureau will redial it up to four times during the first half hour, leaving your computer free for you to work on something else. Transmission for the first page is $3.00, and each additional page costs $2.00. The product retails for $69.95.

For more about *On the GoFAX,* contact Ibis Software, 625 Second Street, Suite 308, San Francisco, California 94107; (415) 546-1917.

Alan R. Bechtold is editor of *Info-Mat Magazine,* an electronic news weekly published by BBS Press Service. ❐

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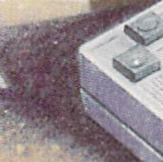

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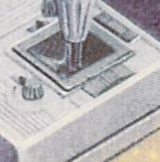

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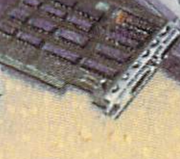

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FEEDBACK

Legal copies, cheers and jeers, parking lessons, bad clusters, and more

Copywrong?

Regarding your answer in the June "Feedback," under federal copyright laws everyone who buys a piece of software has the right to make a backup copy for archival purposes. That's why programs like *Copy II PC* and *Twin Copy* are legal to use. You owe it to your readers to check your facts thoroughly before firing off a reply.

DAVID VIERTEL
AUSTIN, TX

In your June issue, you told Travis May that even a nonworking backup copy of commercial software was illegal. I, and the folks in the Computer Science Department of Southern Arkansas University, where I work, have been under the impression that the new copyright law says that it's legal to make a backup copy. As a matter of fact, everyone that I've talked to suffers from this same delusion. How about a clarification of the current copyright/backup situation?

JACK RYAN
EL DORADO, AR

Your point is well taken. Making personal backups of software constitutes "fair use," a loophole in the copyright law that allows a teacher to copy a page out of a magazine for a class, a reviewer to lift quotations from a novel, or (usually) a computer user to copy software for archival purposes. Although that right is extended by the law, you can at any time give up your rights voluntarily by consenting to a license agreement that prohibits making archival copies. The best way to discover whether it's legal to copy is to check your license agreement.

Our understanding of May's letter (only a small part of which was published) was that he had tried making backups with the standard DOS commands and had not been successful, which indicates that he was trying to back up locked software. License agreements on locked software usually specify that no copies can be made. Use of the software constitutes acceptance of the terms of the license. For this reason, copies created by DOS or other means would be in violation of the license agreement—and therefore illegal—whether they worked or not. Thanks for the opportunity to expand and clarify our response to this question.

Hard Disks, Easy Decisions

"How to Choose a Hard Disk" in the May issue was great—clean, informative, and specific. I especially appreciated the warnings about IDE drives.

ARTHUR J. SOINSKI
SACRAMENTO, CA

Headstop

I use a Vendex Headstart III with a hard disk. I've heard a lot about a head-parking command that should be used whenever a computer is moved. What's the command, and when should I use it? Also, can I have two or more hard drives in the same machine?

WILLIAM D. WAGNER
APO NEW YORK, NY

Usually the command to park the heads of a hard disk is PARK. This command automatically moves the heads to a position where they won't do damage to the disk if a shock or sudden movement causes the heads to come into contact with the disk. Some people advise that if your hard disk requires parking, you should park it every time you turn off the machine. Others feel that you should only park your heads if you're transporting your computer by car or freight. Some hard disks are self-parking, and so using the PARK command is unnecessary. On the other hand, if you're not sure whether your hard disk is self-parking or not, prudence would dictate that you should use the PARK command, if you have it. If you don't have it and you're determined to park your drive, SpinRite II *includes a PARK command. It's sold by Gibson Research, 22991 La Cadena, Laguna Hills, California 92653.*

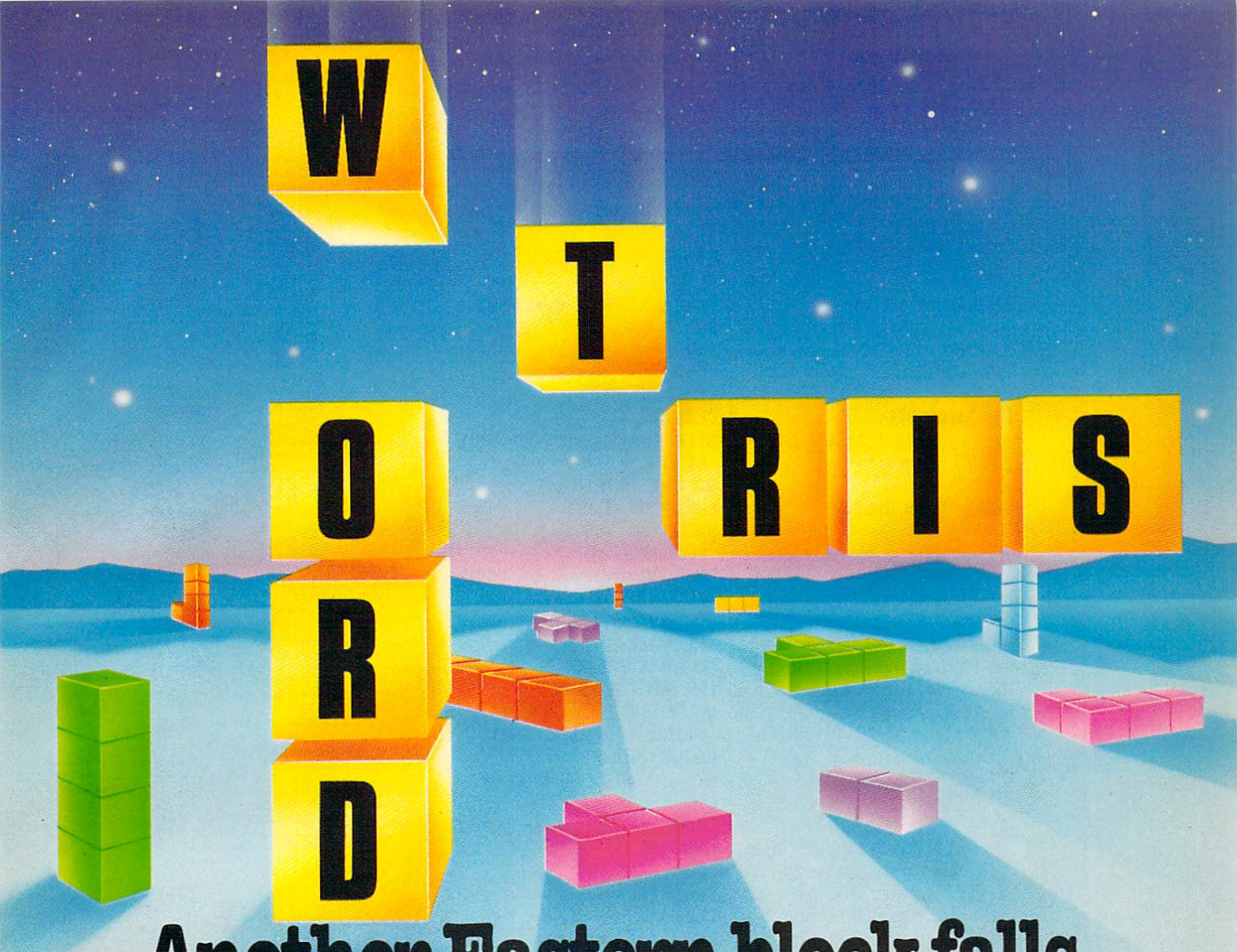
As for adding one or more hard disks, the primary problem with this is the extremely small size of your computer case. The half-height 5¼-inch hard disk you have takes up all the space available.

If you have some free slots, you could add a hard card—a hard disk mounted on a card designed to be installed in the expansion bus. Although the card itself only takes up one slot, most drives stick so far out from the card that the neighboring slot will be inaccessible. An external drive might be a solution.

Not the Same Old Same Old

The magazine that I've been getting for the last year isn't the magazine I started reading back in the early eighties. The last issue of my subscription was no different from at least half a dozen computer magazines on the market. There's very little in your magazine that's of interest to me anymore. I don't care what John Dvorak, Jim Seymour, or Clifton Karnes has to say about networks, laptops, or laser printers because I probably won't ever have one. Your magazine isn't a home computer user's magazine anymore.

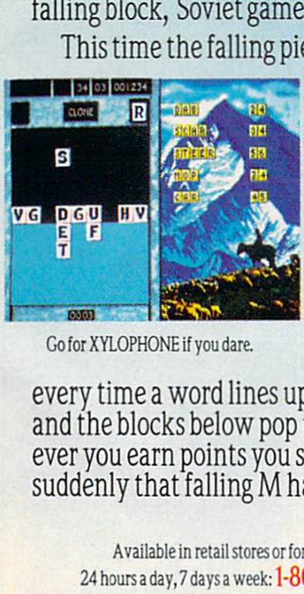
EDWARD R. SALYER
DES MOINES, IA



Another Eastern block falls.

There's a new 'TRIS on the block. Its name is WORDTRIS. And if you love TETRIS, this latest fast-action, falling block, Soviet game will boggle your mind.

This time the falling pieces are letter blocks. Form them into words and score points. As each block falls, it pushes down the blocks below, producing an ever-changing kaleidoscope of letters where scoring opportunities appear - and vanish - at the blink of an eye.



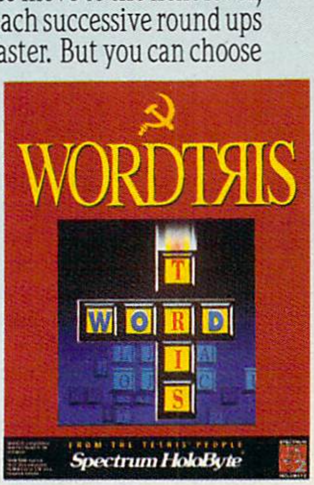
Go for XYLOPHONE if you dare.

Create words horizontally or vertically, but don't put all your E's in one BASKET. Because every time a word lines up, *poof!* those letters disappear, and the blocks below pop up to fill the spaces. So whenever you earn points you stir up the alphabet soup. And suddenly that falling M has no HOME to go to.

WORDTRIS keeps raining vowels and consonants until you've collected enough words to move to the next level, or the well fills up. Of course, each successive round ups the ante as the blocks fall ever faster. But you can choose your difficulty level to match your skills, and select from single player, cooperative, competitive, head-to-head or tournament modes. The built-in 30,000 word dictionary verifies even the most obscure word.

Set the difficulty level at 10 and you'll find WORDTRIS harder to keep up with than the changes in Eastern Europe.

WORDTRIS. Another great game from the TETRIS people.



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Circle Reader Service Number 152

FEEDBACK

Thanks to all who write. We read all your letters and try to be responsive to our readers' interests and concerns.

Dir Straights

After I use the following *QuickBASIC* statement

```
SHELL “DIR > DIR.DAT”
```

I would like to be able to examine the entries in DIR.DAT for the subdirectory names and then change to those subdirectories in order to examine the files in each subdirectory. How can I use the various subdirectory names with a CD command within the BASIC program?

RICHARD KIRCHMEYER
UTICA, NY

The following set of QuickBASIC *commands places the directory listing in a file and then reads the file, creating a second file containing only the names of the subdirectories. It then goes on to create a file called FILES in a subdirectory called TEMP that contains all the filenames in the current directory and all its subdirectories. You could use some recursive variation on this program to look farther down the tree.*

```
dir1$=COMMAND$
IF dir1$=“” THEN dir1$=“*.*”
SHELL“md \temp”
SHELL“dir ”+dir1$+
 “>\temp\temp1”
OPEN“\temp\temp1”FOR INPUT
 AS #1
OPEN“\temp\temp2”FOR OUT-
 PUT AS #2
OPEN“\temp\files”FOR OUTPUT
 AS #3
DO WHILE NOT EOF(1)
LINE INPUT #1,a$
IF LEFT$(a$,1)<>“.” THEN
IF MID$(a$,14,1)=“<” THEN
GOSUB cleanup
IF a$<>“” THEN PRINT #2,a$
ELSEIF LEFT$(a$,1)<>“   ” THEN
GOSUB cleanup
IF a$ <>“” THEN PRINT #3,a$
END IF
END IF
LOOP
CLOSE #1
CLOSE #2
OPEN “\temp\temp2”FOR INPUT
 AS #1
DO WHILE NOT EOF(1)
LINE INPUT #1,a$
SHELL “dir ”+dir1$ +“\”+a$+
 “>\temp\temp4”
OPEN “\temp\temp4”FOR INPUT
 AS #2
GOSUB cleanup:PRINT #3,:PRINT
 #3,“\”+a$
DO WHILE NOT EOF(2)
LINE INPUT #2,a$
IF LEFT$(a$,1)<>“   ” AND
 MID$(a$,14, 1)<>“<” THEN
GOSUB cleanup
IF a$<>“” THEN PRINT #3,a$
END IF
LOOP
CLOSE #2
LOOP
CLOSE #1
CLOSE #3
SHELL “del \temp\temp*.*”
END
cleanup:
a2$=MID$(a$,10,3)
FOR i=1 TO 8
IF MID$(a$,i,1)=“   ” THEN EXIT
 FOR
NEXT
a3$=LEFT$(a$,i–1)
IF a2$=CHR$(32)+CHR$(32)
 +CHR$(32)
OR a2$=“” THEN
 a$=a3$:RETURN
a$=a3$+“.”+a2$:RETURN
```

Readers whose letters appear in "Feedback" will receive a free COMPUTE's PC clock radio while supplies last. Do you have a question about hardware or software? Or have you discovered something that could help other PC users? If so, we want to hear from you. Write to COMPUTE's Feedback, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408. We regret that we cannot provide personal replies to technical questions. ❐

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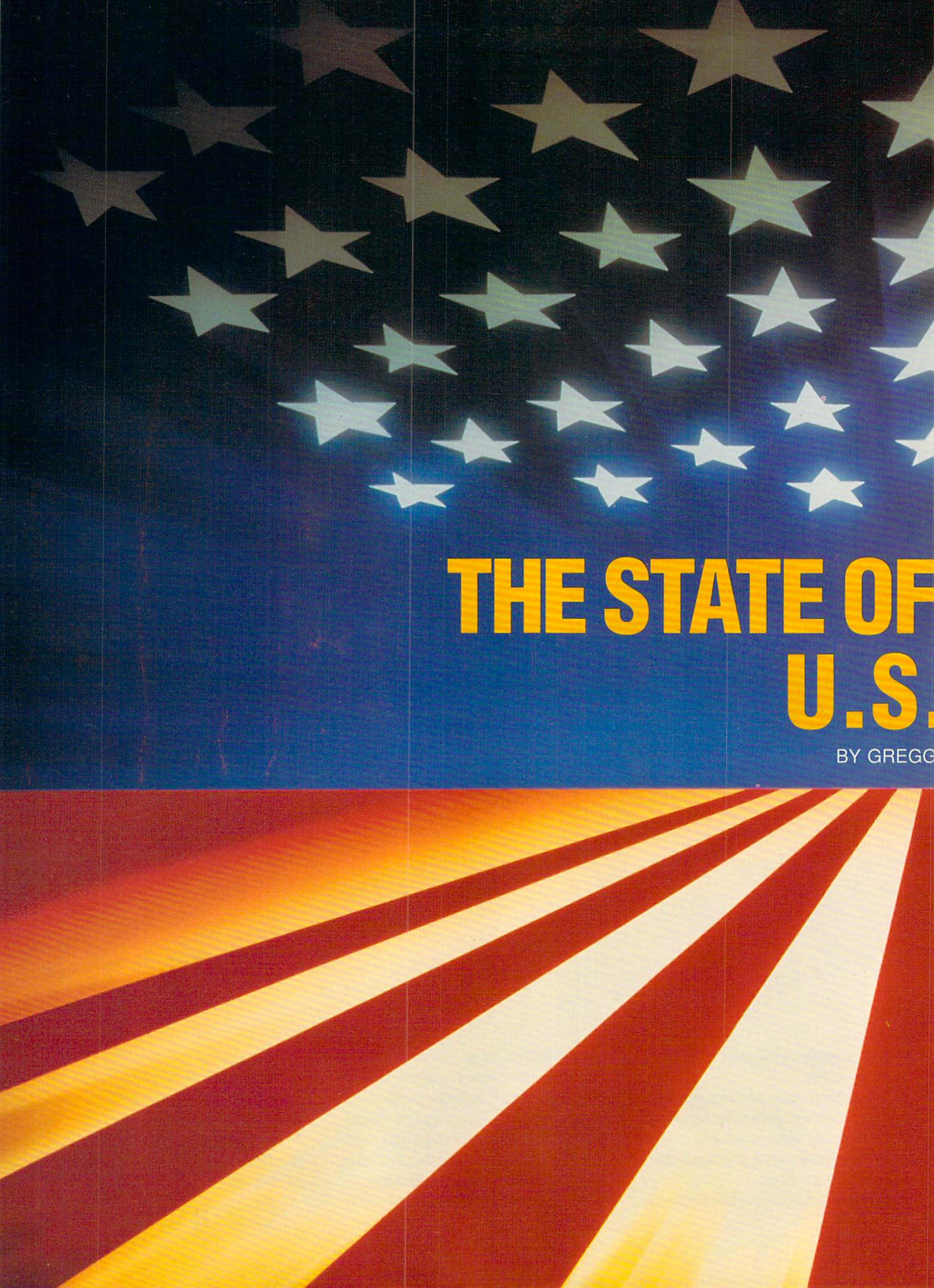

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COMPUTING:
A.

KEIZER

Walk through the door and shout, "I'm home!" and you may get an answer from the kids, a spouse, and half a dozen computers. Computers hide all around your house. Touch the membrane panel of your microwave, and you call on a microchip-based controller. Your telephone-answering machine may record calls not on tape, but in silicon memory. That late-model car out in the garage is smarter than some of the kids you went to school with. And your videogame machine does graphics better than most business computers.

Even if you didn't have a personal computer in your home, you'd still live in a technologically advanced household. But because you do include a computer in your home's inventory, you're part of an important American minority that collectively owns more computing power than such global powers as the Soviet Union, China, and India.

Home computing, once the exclusive province of electronics hobbyists, is now being taken over by millions who might never have touched a soldering iron. As one of those millions, you've got a jump on most Americans. You know how important a PC is for working at home, for accessing immense amounts of information almost instantly, for learning and playing with—a tool and a toy that would have seemed magical only 15 years ago.

Grabbing a snapshot of home computing as it flies by is tough. You've got to lead it a bit, aiming not only where it is today, but where it will be, say, next year. So set your sights on the present *and* the future for a picture of home computing in America.

PC, Go Home

You're in good company. According to Link Resources, a New York–based market research firm, one in four American homes has a computer. Over 30 million computers work at home, not at the office or in the classroom.

Most of these machines run MS-DOS. A smattering of Macintosh, Apple, Amiga, Commodore, and Atari computers may sit at home, but the PC has clearly won on the home front. That's no surprise. The foremost reason new computer owners give for their spending spree is to do job-related work at home. We're most comfortable with what we know—the PCs we use at the office.

And those home PCs are getting more powerful. Where once a floppy disk–based PC with a slow microprocessor and a paltry 512K of memory served, now home PCs typically include a hard disk drive, a color monitor, a megabyte (or more) of RAM, and a 286 or 386SX brain.

HOW DID WE GET HERE?

The path to today's version of home computing, filled with false starts, dead ends, and half-witted ideas, is littered with machines that should never have seen the light of day.

The Handmade Tale

Millions may compute at home today, but less than 15 years ago only a handful of hobbyists had computers at home. Some people built their own from kits while others bought such behemoths as the Radio Shack Model I and the Commodore PET. They rejoiced when the first floppy disk drives replaced cassette tape drives.

Happy Days

Computers shoved their way into American homes by the millions during the early 1980s with games and classic machines like the Commodore 64, Atari 800, and Apple II. Ads played on our suspicions that families without computers produced kids who couldn't cut it at college, even though solid productivity and educational software was nearly nonexistent. The country woke up in 1984 to realize home PCs were one-dimensional appliances that were too temperamental, too hard to use, and too expensive.

The Dark Ages

Computers went home, but no one knew what to do with them. Games started shifting to dedicated machines like Nintendo, and everyone grew tired of filing Christmas-card lists and computing home budgets. PCs ruled the office, but they were still too costly and too tough to use at home.

Taking the Office Home

The late 1980s were a time of excess—including excess work—so people took work home and realized they needed PCs there. Low-priced clones helped. The Mac struggled to hang onto its under-10-percent share; older computers hit the closets.

The Multi Medium

Windows in 1990 and multimedia in 1991 redefined the PC as a graphical tool that could do at home what it could at the office, as well as integrate text, sound, music, video, and still images into stunning educational, reference, and entertainment programs.

The Future

Inexpensive PCs with CD-ROM work in four of ten American homes. Family workstations control notebook and slate computers. Home and office PCs talk to each other via modem and dedicated networks. Kids use slate computers to file homework. High-end simulations make up PC play, but most electronic entertainment comes from the duo of game machine and CD-I player, both connected to a TV.

This trend of high-powered, low-priced home computing is accelerating. Prices of fast 386 PCs have been dropping rapidly. IBM cut prices twice in less than a month. Brand-name compatible manufacturers like Compaq have slashed prices, too, in an attempt to keep profits up and box out the more marginal PC makers. Consumer electronic giants like Samsung and Magnavox are pushing PCs in the mass market, with discount clubs such as Sam's and computer superstores like CompUSA as their ready-made outlets. The recession may have hurt many PC sellers, but it was good news for anyone shopping for a computer. Today you can bring home an amazing machine for around $1,800: a 20-MHz 386SX complete with two megabytes of RAM, Super VGA, a 40MB hard drive, *Windows,* and a mouse.

And it won't be long before the computer in your home will have even more power. Major-league companies like Digital promise workstationlike graphics in a PC, while AT&T–owned NCR has built a minicomputer based on the 80486 chip. Though your home computer won't be as powerful as these monsters, don't be surprised 12 months from now if you're able to buy a 486SX-equipped PC for what you'd now pay for a 386.

More power for less money. That's one trend you won't have to wait for.

Mobile Clones

We love to take it with us. Even if we're not on the move, we like to pretend that we soon *will* be.

No part of the PC business bloomed as quickly during the last year as the portable computer market. A blizzard of laptop and notebook computers debuted during 1990 and 1991, enticing on-the-go professionals in sales, real estate, insurance, and financial fields to computerize.

The average portable computer is a no-features featherweight, but recently the market has grown to include 286, 386SX, and even 386 microprocessors; VGA graphics; multiple megabytes of RAM; large capacity hard drives; and long-running batteries. Briefcase-size computers compete with desktop systems in almost every performance area.

Notebooks, the under-seven-pound category, are the hottest draws. Such notable examples as the Sharp 6220, the Texas Instruments TravelMate 2000, and the ZEOS 286 all tip the scales at around five pounds. These machines, and others, are light enough to take everywhere you go.

The rush to faster processors has spun down the prices of older, but still

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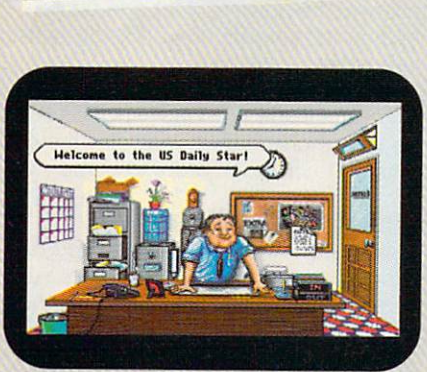

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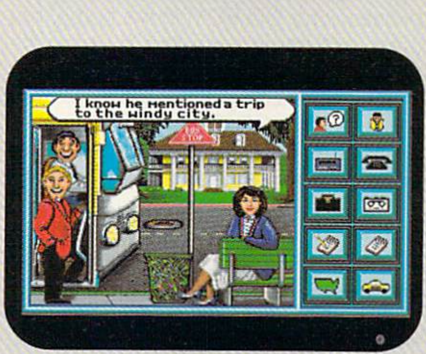
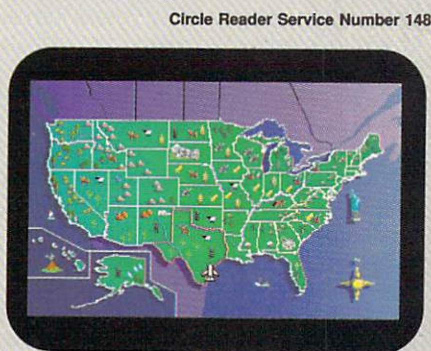


I know he mentioned a trip to the windy city.

A good reporter always asks the right questions.



Travel across the U.S. in search of headline news.

Available at Babbages', CompUSA, Egghead Discount Software, Electronics Boutique, Radio Shack, Software Etc., and other fine retailers.

capable, portables such as the Toshiba 1000 SE and the low-end Bondwell machines. Portables can be found for under $1,000 and make attractive second-computer alternatives to homebound desktop PCs. Laptops already account for almost 10 percent of home computers.

One portable trend seems clear, and one more muddied. Notebooks will get slightly lighter, much less expensive, and more powerful, and will have longer battery life. Hand-held computers, called palmtops, probably won't work their way into many homes, but further ahead, slatelike computers (with pen operating systems) built from inexpensive components may.

As laptops, notebooks, palmtops, and slates become better able to handle your computing chores, their impact on home computer purchases will be striking. If so many computers are bought for at-home work, why would you buy a desktop computer for the house when you can take your office machine home with you in your briefcase or your pocket?

Portable computers freed us from the desktop. Will they also be able to free us now from the separation of office and home computing?

We're All Gutenbergs

First impressions are important. They must be, or we wouldn't spend so much time on our home computers churning out slick office documents, school reports, and family newsletters.

The notion that almost anyone equipped with a computer can produce high-quality printed materials is such a powerful idea that millions have bought it—along with the necessary hardware and software. Home office workers in particular like how desktop publishing has made their firms seem larger than life.

A laser printer, the crucial component of good document generation, is a great equalizer. It's difficult to tell whether a letter was printed with a Hewlett-Packard LaserJet III at a business or with a LaserJet IIP at home. Once too expensive for any but the most fanatical home publisher, laser printers have dropped in price and expanded in features nearly as fast as computers.

Several laser printers broke under the $1,000 list price barrier last year. Leader Hewlett-Packard aimed its LaserJet IIP at the single user and in the process discovered a ready market in homes and home offices. Companies like Okidata, Canon, Toshiba, and Epson all carry laser printers that commonly sell for around $800. Analysts predict that the popular IIP will sell for as little as $700 next year.

Other printer technologies are making an impression on the home market as well. Inkjet printing technology, even less expensive than laser, is especially well suited for the home, where high volume and high speed are less important. Portable printers such as the tiny two-pound Citizen PN48 illustrate the trend in miniaturization. Printer addons that transform your laser printer into a plain-paper fax machine are already available .

With price competition so stiff, home computer owners can expect personal laser printers—machines that pump out four pages or less per minute—to settle in the $600–$700 range during 1992. More featurebound printers, those with PostScript, for instance, will remain above the $1,000 mark, but they'll close on that magic number. The Texas Instruments Microlaser PS-17, for example, often sells for $1,350. Look, too, for laser printers to keep shrinking in size and for specialty printers to include fax reception and printing.

Beaucoup Bits

The promises of CD-ROM entice even the most jaded home computer user. Who wouldn't like an entire encyclopedia on a disk? By packing hundreds of megabytes of data on a platter that looks just like an audio CD, CD-ROM puts vast amounts of information at your fingertips.

CD-ROM may finally find a way home if several computer makers are successful in selling their player-equipped models. Tandy, a giant in the home and home office markets, recently introduced a series of computers with CD-ROM capabilities. With base machines that stretch from a bottom-end 16-MHz 286 model (Tandy M2500 XL/2) to a powerhouse 33-MHz 386 machine (Tandy M4033 LX), this line does much to legitimize home CD-ROM. Magnavox's HeadStart/SX-20 CD computer, part of another CD-ROM series, is especially attractive to the home user; it includes not only a CD-ROM player but also several discs.

Software has been slow to arrive for reference and education, two major applications for CD-ROM in the home, but there are some excellent discs available. Grolier's *Illustrated Encyclopedia* and Bureau Development's *U.S. History on CD-ROM* are outstanding discs that by themselves justify the price of a player. National Geographic's *Mammals: A Multimedia Encyclopedia* teaches kids about animals with 700 color photographs, 150 maps, and 45 full-motion video clips.

The shallow software pool and the added price of players will keep the lid on the CD-ROM market at least through 1991. After that, all bets are off. That's because multimedia, a hot new complex of technology, will push CD-ROM into the limelight and possibly generate some software that home computer users won't want to do without.

An unknown in all of this is how noncomputer players like Commodore's CDTV and Philips's Magnavox CD-I model will affect CD-ROM. These players, controlled by hand-held navigators and featuring entertainment and educational software aimed right at the home, are touted by some as the next VCR. With no keyboard or computer to intimidate, their strategy is to infiltrate millions of homes and leave CD-ROM computers in the dust. Will they? Experts are waffling on that question. Only one thing is certain: Some form of CD is in your home computer's future.

Someone's Buying the Stuff

You'd be hard pressed to tell that the economy is in a slump if you looked at the software sales charts. According to the Software Publisher's Association (SPA), North American software sales were 26 percent higher in 1990 than in 1989. Lee Iacocca would kill for a growth rate like that.

Some interesting stories hide among those numbers. Naturally, PCs dominated the software side of the business just as dramatically as they did the hardware, with nearly 80 cents of every software dollar spent on MS-DOS or *Windows* packages during 1990.

Other systems simply tagged along, if they succeeded at all. Macintosh ran a very distant second, accounting for only 13.3 percent of total software sales. The Apple II and Commodore 64 software droughts so evident on store shelves were borne out by the SPA data, which showed a 16.5-percent drop in the former and a whopping 42-percent decline in the latter during the year. And Amiga software couldn't climb out of its small (2-percent) market share.

Meanwhile, *Microsoft Windows* and *Windows* applications ended the year as winners, growing nearly 160 percent over the previous year and cornering over 10 percent of worldwide software sales.

Clearly, PCs rule the software roost now, and with the *Windows* explosion only a little more than a year old, they'll continue to crow for years to come.

Working Hard at Home

Work is work, no matter where you do it. Increasingly, home computers run the same software and perform the same tasks as machines in the office.

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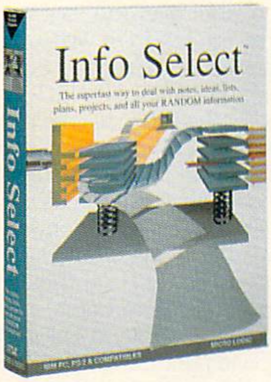
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The #1 PIM

What's all the fuss about PIMs (Personal Information Mangers)? Simple - you probably have more RANDOM information than any other type and you need a PIM to properly handle this kind of information. The right PIM will save you time and make everything you do go smoothly.

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INFO SELECT is memory resident (if you choose), so you can quickly jump in from other programs. Info Select windows can hold: notes, plans, lists, facts, letters, contacts, and much more. You can search for a window or a group of windows related by a word or phrase. There are five ways to see overviews; hypertext, a fast sort, and line drawing. Save time with the dialer, date tickler; and searching by text or date ranges.

If you have notes, ideas, contacts or other unorganized RANDOM information, you need Info Select.

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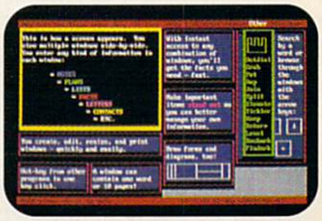

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386 PC, you can crunch numbers with *1-2-3*, pound out reports with *WordPerfect*, or compile charts with *Harvard Graphics* long after the kids are in bed. This power can also form the foundation of your home business, letting you compete with larger companies because you're using the same hardware and software tools they use.

Productivity is king at home. The top two home computer uses, reports Link Resource, are word processing (69.6 percent of those with a home computer say they use word processing software) and file keeping (62.4 percent). Not far behind are graph and chart making (41 percent), budgeting (40.2 percent), and spreadsheet work (38.6 percent).

Home computer work is changing, though. Integrated software—affordable all-in-one packages combining word processing, spreadsheet, and database modules—once were the home computer user's dream. The gleam's gone, it seems, since integrated software was the only PC category to post a drop from the previous year. One possible reason: It's easy to integrate several separate, full-featured programs with a graphical environment like *Windows* or *GEOS*.

But financial and tax applications show no signs of loosening their grip on home computers. Of people who are looking to buy their first home computer, one out of every four indicates budget making and tax preparation are the reasons for their purchase. The result? *Quicken*, an easy-to-use personal accounting program, appears on virtually every bestseller chart. Conveniences such as electronic bill paying and tax filing will become the rule, not the exception, at home.

Although stripped-down versions of corporate productivity packages are often perfect for the home—*LetterPerfect* instead of *WordPerfect*, *Personal R:BASE* instead of *R:BASE*—the trend is to equip the home with the same software functionality as the office.

What else would you expect when so much work is done at home?

Go Ahead—Teach Me

We only pay lip service to educational computing. We say we're buying a computer for the kids, but we don't often put our money where our mouth is. Prospective home computer owners rank their children's schoolwork as the second most popular reason for wanting to buy a machine. More than half of current owners claim they use their computers for educational applications. But we spend less than a third as much on PC educational software as we do on games.

What's the problem?

Maybe it's the wretched state of much of what's labeled as educational by software publishers. With many packages crippled by boring and repetitive play, crude graphics, and lack of sound effects, it's no wonder kids turn off the computer and hit the Nintendo instead. Fortunately, a few educational software publishers are waking up to the fact that kids want some sizzle with their electronic schoolwork.

Edutainment, as some call the category, mixes traditional game elements with carefully crafted educational ideas to subtly teach things to kids. Its origins can be found in such long-running lines as Brøderbund's Carmen Sandiego games, which successfully combine learning geography and history with detective-style gameplay. More recent examples come from the Learning Company and its Super Solver series.

These efforts are paying off. According to the SPA, 1990 was the first year that PC educational programs outstripped the combined sales of Apple II and Macintosh learning software. Educational software sales grew by 48 percent from 1989 to 1990, beating out such stalwart categories as games, word processing, and desktop publishing in the growth race. And though much of this increase is undoubtedly due to an increased emphasis on the PC in the classroom, MS-DOS is the first priority of every major publisher that sells home education software.

Home learning's future depends on more and better CD-ROM software, even more gamelike style, and superior speech. The last may be most important, as impressive new text-to-speech capabilities—like those pioneered by First Byte and now utilized by Davidson & Associates—create entirely new types of educational software.

Pick your packages carefully, and your kids won't know they're learning.

Fun Against All Odds

The numbers are staggering. Over 42 *million* Nintendo videogame machines sit in American homes. Nintendo sold approximately 8 million copies of its *Super Mario Brothers II* cartridge. Videogame systems and cartridges rang up a whopping $3.4 billion in sales during 1990.

By comparison, computer software publishers sold only $355 million worth of disk-based games last year. Computer game makers count themselves lucky if a program sells 50,000 copies.

One of the most significant home computing developments in the last five years is the steady erosion of entertainment. At least one type of game is already lost to the cartridge machines. Arcade games, traditionally built on quick joystick action and rapid fire, are all but gone from the computer scene. Other categories of computer games are in danger. Sophisticated sports games now show up on cartridge, as do a handful of role-playing games and simulations, such as *Ultima* and *SimCity*.

Game developers fight back with increasingly complex products, especially high-end simulations like *SimEarth*, hybrid arcade/role-playing games like *Strike Commander*, and long-length adventure games like *King's Quest V*. PC entertainment sales climbed slightly faster than the overall average, but cartridge systems returned fire with more powerful machines like Nintendo's Super NES and the CD-equipped NEC TurboGrafx. Looming behind these are players based on CD-I (Compact Disc, Interactive) technologies, which might spell the end of most computer games.

Because PC developers compete for a finite number of electronic entertainment dollars, they must look for new ways to play off the home computer's strengths. The Sierra Network, an online amusement park where you play against opponents via a modem, is an area that shows promise. Another is an increasing reliance on the PC's powerful processor and 256-color VGA graphics to handle games that cartridge systems simply can't duplicate.

Watch for a small flood of CD-ROM games in 1992. Expect to hear more involved soundtracks and digitized speech, see more photographic-style graphics, watch more Disney-style animation, and play more sophisticated simulations in the areas of electronic life, military weapons, and sports.

You'll keep playing on the screen. But unless home computer games fight back, that screen may be your television, not your PC's monitor.

Eyes on the GUI Prize

The Macintosh is on a roll. Last year's lower-priced models—particularly the Classic for under $1,000—literally sold faster than they could be built. Surprising nearly everyone, the success of the Classic and its color cousin, the LC, will put new Macs in at least half a million homes by the end of 1991.

The Mac's biggest drawing card is its graphical user interface (GUI), the desktop metaphor where icons represent applications and files, mouse clicks launch software, and programs look and often work alike. Apple's new System 7.0 recaptures the lead in GUI expectations from *Microsoft Windows*.

Windows 3.0 is only a year and a half old, and already it's selling half as many programs as those for the Macintosh. The intense interest in *Windows* applications demonstrates that at least some PC owners are drawn to the

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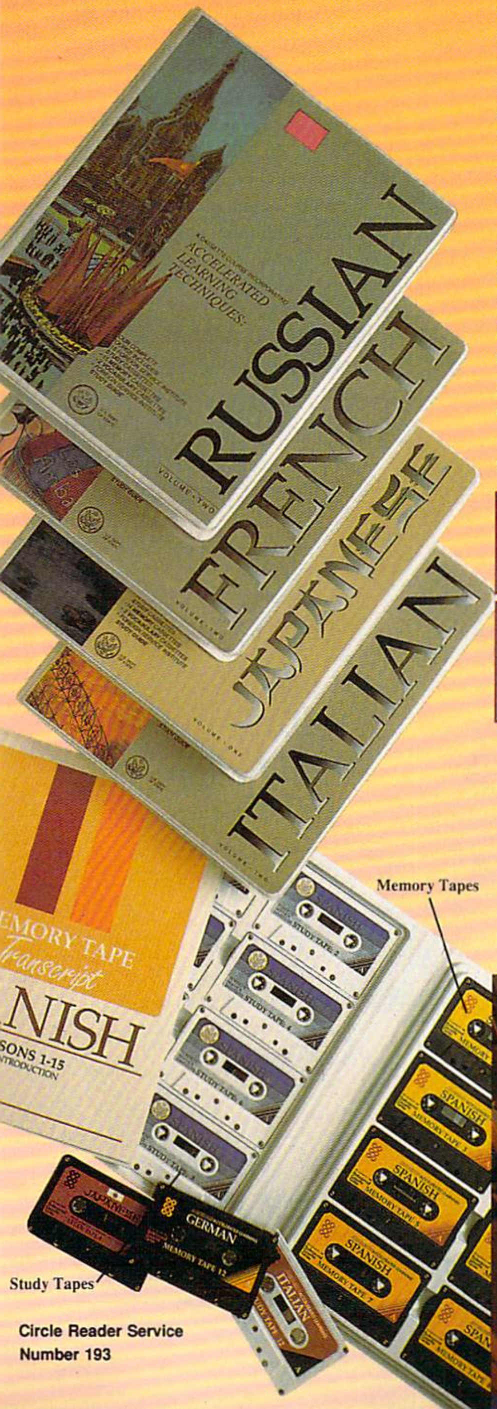

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prospect of a graphical environment.

But is *Windows* something important for the home? Right now? Hardly.

Windows' hardware requirements leave out all but the best-equipped home computer users—those with a 386SX or 386 machine, two megabytes of RAM, and a VGA display. But that's not to say that home computer users aren't casting eyes on GUIs.

GeoWorks Ensemble—a graphical environment complete with minimalist applications—sits atop DOS and provides an elegant solution for anyone with an 8088, 8086, or 286 PC. In some ways slicker than *Windows,* this GUI is perhaps best demonstrated by America Online, a new telecommunications service that simplifies sending E-mail and downloading software.

That's today. What about tomorrow?

Perhaps one in ten home computer users looks at a graphical environment, with most of them seeing a Macintosh. But the trend toward GUIs seems irreversible, especially for the home user. More and more computer makers bundle *Windows* or *GeoWorks Ensemble* with their machines, particularly those sold as just another piece of consumer electronics. And GUI ease of use makes perfect sense in the home, where there isn't always someone around to show you what to do.

Computers must be simpler to use if they're to climb out of their one-out-of-four-households ghetto. GUIs will be a crucial part of the catalyst that takes millions more computers home.

Just Around the Corner

Home computing rarely stands still long enough for anyone to form a complete picture. In a few years, that picture may be nearly unrecognizable.

"I see a division of computing and game playing," says Ken Williams, president and CEO of Sierra On-Line, one of the country's biggest computer game producers. "There'll be something that will sit on top of your TV—maybe it's CD-ROM based—that looks just like a stereo component." That's what we'll play with, says Williams, while we relegate our at-home work to a more familiar personal computer. "The next big leap [in games] will be to get away from text," Williams says. "If the motion picture industry had to depend on silent pictures, it wouldn't be much."

Speech is vital to the future of education on the home computer, too, according to Jan Davidson, president of Davidson & Associates. "I think there will be huge movements in speech technologies," she says, adding, "I'm sure there will be educational applications using very interactive video in very compelling ways." Unlike Williams, Davidson isn't bullish on players without keyboards. "I don't believe the keyboard is going to go away as quickly as other people think. Players certainly will have their appeal with entertainment, but I wonder if they'll be useful tools for things like education."

Brian Dougherty, CEO of GeoWorks, looks ahead and sees a multicomputer home. "There'll be an under-$500 slate computer by 1995," he says. Based on a pen approach, where you navigate on a flat screen with a stylus and write by hand, these slate computers are "very plausible," says Dougherty. "It's something that you can throw in your purse. Several people in a home will have these, and they'll link them up with the home's multimedia PC."

These three people—and most others who follow home computing—agree on one thing: Home computing in 1995 will be different, very different.

Home for Some, Not for All

Optimists like to think of the computer as the VCR of the 1990s, a consumer electronic device that soon will end up in virtually every home. That's clearly not in the cards, not soon anyway. At the current rate of growth, it'll be the turn of the century before even 40 percent of America's homes have a personal computer. VCRs blink 12:00 in nearly twice as many homes today.

A home computer is a powerful tool all members of the family can use—if they'll use it. Barely half the adults and a quarter of the kids with a computer in their homes use the machine.

People avoid buying computers because they're still too expensive. People avoid using the computers they have because the machines are still too complex. Lower-priced, simple-to-work computers are the key to any dramatic upswing in home computer ownership.

Some progress glimmers in the distance. Graphical user interfaces make many computing chores easier and cushion new users from the arcane ways of computers. Multimedia—if by that you mean integrating sound, graphics, and text into a coherent whole—may shove ease of use up another notch. And prices are slipping, if not tumbling. Whether you're buying a laser printer, notebook computer, or desktop system, you'll spend less this year than last.

Maybe computers will never occupy space in every home. Maybe they shouldn't. Not in their current form, not in their current roles. But to an increasing number of Americans, today's home computer is as indispensable as the television and the telephone.

America—what a country! ❒

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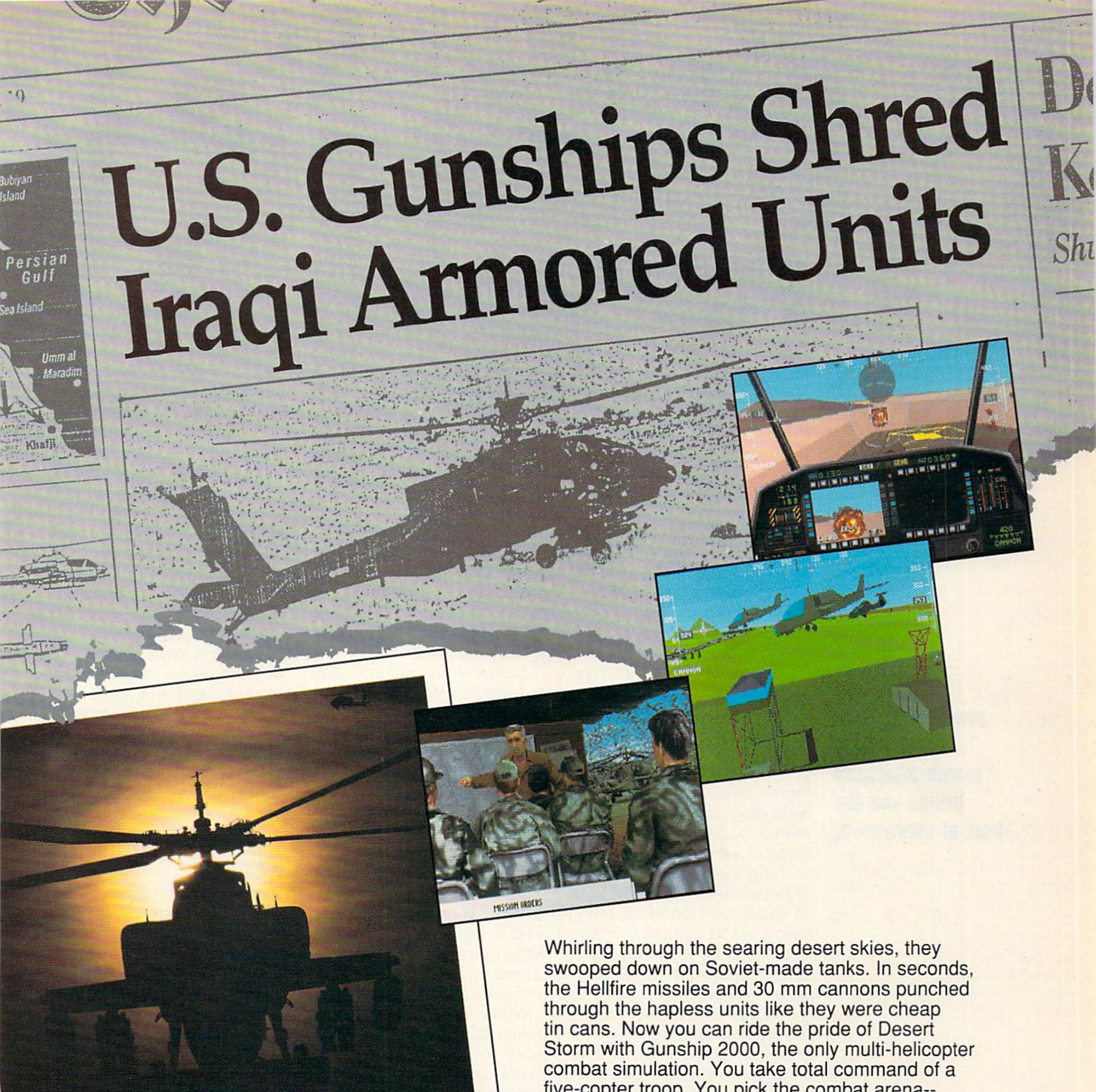
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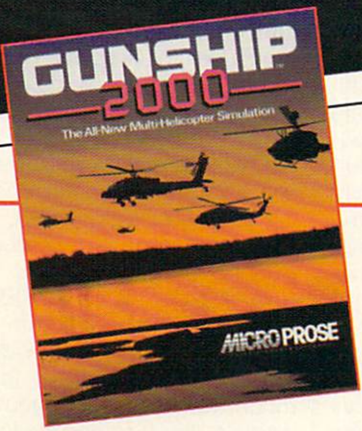
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Circle Reader Service Number 157

SHAREPAK

Richard C. Leinecker

FOUR HITS MADE IN THE U.S.A.

Checkmate your PC, or let it speak. Every month *Sharepak* brings you the best of shareware.

Since this month's editorial theme covers the state of computing in the U.S., we bring you four excellent, state-of-the-art shareware products that push the techno envelope.

Straight out of sci-fi flicks, *SPEAK* will give your computer a voice all its own. With *NorthCAD-3D,* you can design and view complex 3-D objects. *Conquest* gives board-game lovers the chance to conquer the world. And finally, *WAXMAN* challenges you to a chess game that pits you against the most formidable opponent of all—your computer.

If you're new to *COMPUTE* and *SharePak,* you'd probably like to know how we select the programs that appear each month. First, we look for shareware programs that match the theme for this month's issue. Second, we spend time downloading files from the online services, saving you the cost of expensive connect time, which would amount to many times the cost of buying a *SharePak* disk. Then, we evaluate every program, choosing those we think will interest you the most. Finally, we work with program authors to fix any bugs and change any features that we feel are necessary to make the programs the best they can be.

You'll be glad to know that every program and disk is carefully checked for viruses. Also, we provide technical support during our regular business hours. Finally, we offer a money-back guarantee—if you don't like your *SharePak* disk, just return it for a full refund.

SPEAK

This program will make your computer "come alive" and speak to you. Use any text editor or word processor to create an ASCII file of the text you want your PC to speak. Then, from the DOS prompt, just type SPEAK *filename.* This creates a self-contained COM file that holds all the speech information. Then to listen, you simply type *filename,* and your computer does its thing, "speaking" whatever you've typed in the ASCII file.

Although fun to play with, *SPEAK* is much more than a novelty program. For instance, you can create batch files that speak, and the program is really invaluable for young children or those with reading difficulties and for the visually impaired.

Speak runs on any IBM compatible with 256K of available RAM and any monitor. No special hardware is required for playback.

NorthCAD-3D

NorthCAD-3D is a design and modeling program that lets you create, view, and edit 3-D objects and images. The program is completely menu-driven, which makes it a snap to learn, and it has a versatile command set that emphasizes conceptual design and illustration.

NorthCAD-3D allows you to create drawings from any viewpoint, or you can view the same drawing from several simultaneous viewpoints—even while using the drawing functions. Plenty of sample files are included that illustrate just what you can create with the program—and how.

To run *NorthCAD-3D,* you'll need an IBM compatible with 512K of available RAM and a CGA, EGA, or VGA monitor. Math coprocessors are supported. We suggest one to really speed things up.

Conquest

I'd love to count the hours I've spent playing world-conquest board games. Now I might have to add to that number since I got a copy of *Conquest.* It's a great continuation of the world-conquest board-game tradition. And should some of your opponents happen to be remote, you can play through a modem—which is a real boon to board-game addicts like me.

The game looks terrific with a lot of colorful screens to portray the world and territories. An easy-to-use menu-driven interface lets you play with no hassles. Optional mouse support adds a nice, professional touch, too, for those who would rather not fool with a keyboard. If you want to know more, you'll have to get the disk and check out *Conquest* for yourself. You'll love it.

To play *Conquest,* you'll need an IBM compatible with 256K of free RAM. You'll need a Hercules, CGA, EGA, MCGA, or VGA monitor.

WAXMAN

This is a great chess program you'll find hard to beat—in more ways than one. First of all, the game itself is a formidable opponent. Even chess enthusiasts will have a hard time beating *WAXMAN.* Second, you can run the game as a stand-alone or as a memory-resident program. For example, you can start a game and then work in your word processor for a while. Then, when your intuition kicks in and you know what the next move should be, you just hit the hot key, make your move, see what the computer does in response, and return to your word processing while thinking of the next move.

WAXMAN runs on any IBM compatible computer with at least 65K of available RAM. The program runs in text mode, which means if you're inside a graphics application, *WAXMAN* won't pop up. ❐

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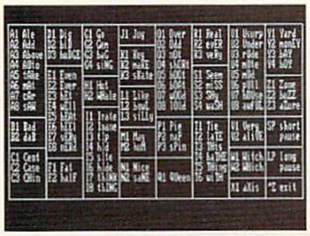
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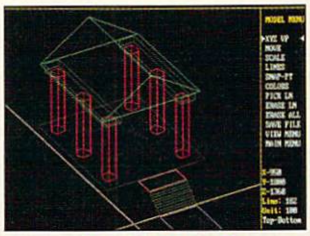
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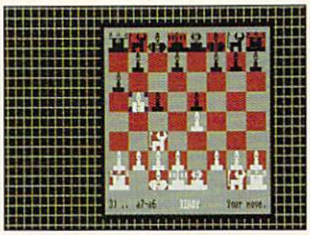
WAXMAN

COMPUTE's *SharePak* disk contains the best of shareware—handpicked and tested by our staff—to complement this month's focus. You'll sample entertainment, learning, and home office software at a great savings. Each *SharePak* disk includes two to five programs plus complete documentation for one low price:

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Access hundreds of megabytes of data. That's the promise of CD-ROM technology, and it's here today, faster and more affordable than ever. This month's Test Lab examines ten capable CD-ROM drives and gives you the information you need to understand the technology and make wise buying decisions. In addition to benchmark test results and instructive sidebars, this month's Test Lab offers hands-on reviews that explore everything from installation and documentation to special features and software bundles. So whether you plan to consult an online encyclopedia, find a business address, play a game, or take advantage of the educational benefits of multimedia CD-ROM software, read on. This month's Test Lab will help you find the CD-ROM drive that's right for you.

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CD TECHNOLOGY PORTA-DRIVE

CD Technology's Porta-Drive does its job well. Whether you're playing a game with your children, researching a report, or learning about the world around you, this CD-ROM drive takes only a reasonable amount of time and effort to accomplish what you've asked it to do.

I found it to be slightly slower than my hard drive, an adequate speed considering the wealth of sounds (on computer CDs—it doesn't play music discs), sights, and data it allowed me to access. To increase the drive's speed, CD Technology uses a 64K memory buffer.

The Porta-Drive itself is remarkably compact, about the size of a hardcover novel, though heavier at 3.8 pounds. Its two controls—an eject button and a volume slide for the headphone jack—make the Porta- Drive by itself much easier to use than an audio CD player. CDs enter and exit the machine in an accompanying CD caddy.

Installing the Porta-Drive takes little technical knowledge or mechanical skill. After removing your PC's cover, you simply plug the card into an expansion slot and then hook up the cable to the card's port. A separate power box simply plugs into the back of the device. The software driver provided with the Porta-Drive installs itself on a hard drive, automatically altering your AUTOEXEC.BAT and CONFIG.SYS files so the machine is ready to go every time you boot up. The driver allows you to lock and unlock the player and eject the CD caddy using only keyboard controls.

If you run into trouble, the user manual for the Porta-Drive provides adequate information. It's well organized and generally clear, though it lacks both an index and a section of troubleshooting tips. The machine comes with a two-year warranty. Technical support is available either through a 24-hour bulletin board service or by calling the company directly, though neither call is toll-free. As simple to install and operate as the machine is, though, most people will probably have little trouble.

Despite the cost of CD-ROM drives and their inability to accept data from your computer, their storage potential will obviously appeal to a great number of computer enthusiasts. If you're in the market for one of these mass-storage marvels, the Porta-Drive has a lot to offer in a little package.

EDDIE HUFFMAN

Circle Reader Service Number 301

CHINON CDX-431

A solid performer from setup to shutdown, the Chinon CDX-431 opens the door to laser disc storage at a reasonable price.

This particular Chinon unit comes with the CD-ROM drive housed in a slim case, a CD caddy for loading your discs, a SCSI interface card, an interface cable, and software that includes Microsoft's CD-ROM extensions and the Chinon device driver.

Installation is straightforward and rather simple, provided you're comfortable opening up your computer's case. (If you aren't experienced in this area, ask someone to help you or take your PC to a local technician for assistance.)

Software installation is also easy. You can install either to your hard disk or to a second floppy disk. The setup program will copy the CDX-431 device driver and Microsoft extensions to the directory of your choosing.

**Test Lab street prices are an average of prices advertised in computer magazines and national newspapers during July 1991.*

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Warranty: one year
Service Plan: through the company (customer ships)

In addition to its CD-ROM capability, the CDX-431 gives you the ability to play audio CDs by means of its CDPLAY program. After you invoke CDPLAY, you can program the player as you would a CD deck connected to your stereo. The CDX-431 includes audio jacks for connecting speakers (using standard RCA plugs) or for connecting the drive to a stereo system. There is also a headphone jack.

In several months of use, I had virtually no problems running the CDX-431, and those few problems I did encounter turned out to be related to various third-party CD-ROM applications and not to the hardware system.

I used the drive with a variety of text-based and graphics-based CDs. The caddy and loading mechanism worked smoothly and without any noticeable degradation in performance throughout my use of it. I was able to launch applications both from the DOS prompt and from with in *GeoWorks Ensemble* and *Microsoft Windows*.

The CDX-431 offers 150-kilobytes-per-second continuous throughput, which makes it standard with what Bill Gates has defined as the minimal performance criterion for a multimedia CD device.

The company rates the disc's access time at 350 milliseconds, which is many times slower than that of a hard disk. But keep in mind that the advantage of CD-ROM technology isn't in the speed of the access; it's in the volumes of information available to you at any one time and the potential for providing innovative means for presenting and using that information. This coming year may indeed be the year of the CD, as prices drop and manufacturers like Tandy, Sony, and Magnavox bring CD-ROM drives and CD-ROM–equipped computers to the consumer market.

Whether you want access to extensive databases, the ability to play the latest and most comprehensive entertainment and education programs, or the pleasure of playing audio CDs as you complete your office work, the CDX-431 will meet those needs.

PETER SCISCO

Circle Reader Service Number 302

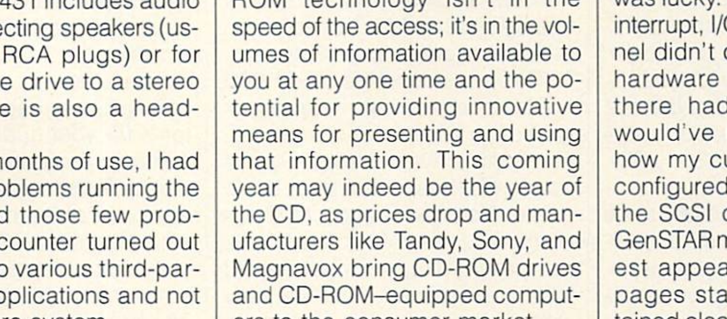
GENESIS GENSTAR 2000

Setting up the GenSTAR 2000 turned out to be an exercise in plug-and-play simplicity. I just popped the SCSI interface card into an open slot in my PC, connected the cable from the card to the CD-ROM player, and turned the machine on.

To install the software, I ran GenSTAR's setup program, which configured my computer to automatically load two CD-ROM drivers at boot-up. I'm using DOS 5.0, and after a little tweaking, I was able to load both drivers into high memory.

The whole installation process took less than 15 minutes. But I was lucky. The interface's default interrupt, I/O port, and DMA channel didn't conflict with any other hardware devices in my PC. If there had been a conflict, I would've had to know exactly how my current equipment was configured and be able to adjust the SCSI card accordingly. The GenSTAR manual, despite its modest appearance (20 loose-leaf pages stapled together), contained clear instructions and illustrations on reconfiguring the card and would've been an excellent guide had I needed it.

After installing the GenSTAR, I was able to start using it immediately because of its gaggle of bundled CD-ROM software. In-



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cluded are four titles from the Software Toolworks—*Reference Library, Illustrated Encyclopedia, U.S. Atlas,* and *World Atlas*—plus *Mammals* from the National Geographic Society and *Languages of the World* from the Sony CD-ROM series.

I found *Reference Library* to be extremely useful. It boasts a spelling checker, dictionary, thesaurus, quotation index, general reference, history, listings of business addresses and phone numbers, a legal and corporate handbook, and a concise writing guide. You can run *Reference Library* either as a stand-alone program or as a TSR. Either way, its easy-to-use interface with pull-down menus and mouse support makes browsing a pleasure.

The other bundled titles were nearly as interesting, useful, and entertaining as *Reference Library*. And it's comforting to know that if I ever get tired of accessing this huge chunk of the world's accumulated knowledge, I can take advantage of the fact that the GenSTAR is also a functional music CD player by popping in a disc, plugging in my earphones, and tuning in to Mozart.

CLIFTON KARNES

Circle Reader Service Number 303

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(800) 527-3766
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Street Price: $1,199
Warranty: one year, including technical support
Service Plan: through shipment to Pioneer's service center

PIONEER DRM-600

Pioneer's DRM-600 CD-ROM changer can add volumes of data retrieval power to your system.

The shoebox-size DRM-600 holds up to six discs, inserted together in a special magazine. The configuration software gives each of these discs a drive name. You can switch to these discs, access information, and run programs just as you would from any ordinary disk. The only difference is that you can't write to the read-only CD-ROMs.

Once the interface board is installed inside the PC, the drive itself is connected via the supplied SCSI cable. With only four feet of cable to work with, though, I had difficulty locating a spot to park the rather large DRM-600 while still leaving workspace on my desk.

Installation of the device drivers went smoothly, despite sketchy documentation. The setup program is conscientious about documenting the changes it makes to startup files.

Once you've installed the DRM-600 CD-ROM changer, it's simple to operate. I found that the hardware worked without a hitch. Text searches were fast, and graphics screens drew quickly, though not seamlessly.

In addition to being useful as a computer drive, the Pioneer DRM-600 also plays audio CDs. The music brightened up our office, but the software to control the sound was inconvenient and poorly documented.

The DRM-600 includes a stereo earphone jack as well as RCA jacks so that output can be directed to a stereo amplifier. The drive package includes a set of RCA cables, but again, the short length required me to add my amplifier to an already crowded desk.

Two programs are provided to handle audio CDs. *Multi-Play Control* allows you to select discs or tracks to play, and once the music is underway, you can execute other programs on your PC. Sadly, I found no way to program more than one musical selection at a time.

The other program, *Juke*, allows you to create tables of contents for your audio discs and to select a program of music that can include any or all tracks from any or all of the discs in a magazine. But, since *Juke* isn't a TSR, you can't exit and work with other software while the music plays. The brief documentation for both programs, unfortunately, doesn't fully explain the software.

Being able to insert as many as six discs is convenient, but the magazine that holds them is difficult to manage. The discs must be loaded upside down, which feels awkward and makes it impossible to read the labels.

The Pioneer DRM-600 is a sound piece of hardware. As a SCSI device, it can be daisy-chained with a second drive or other devices, and it's a good bet to remain compatible as the CD-ROM software and hardware evolve. Its great capacity makes it a candidate for networked environments where volumes of resource material could be made available to many users.

TONY ROBERTS

Circle Reader Service Number 304

PROCOM MCD-ROM 650/E

PROCOM TECHNOLOGY
200 McCormick
Costa Mesa, CA 92656
(800) 800-8600
List Price: $895
Street Price: $747
Warranty: one year (extended warranty available)
Service Plan: through shipment to the company (repair and return within 48 hours)

The Procom MCD-ROM 650/E drive offers flexibility that makes it a good choice if you've got more than one type of computer.

The drive that I reviewed included software for both the PC and Macintosh, cables for both units, and a SCSI AT-bus interface card for the PC (CC16 Enabler—$349). The drive itself is housed in a nicely styled, light-gray external case with the power supply beside the drive. This makes the Procom somewhat wider than some other drives, so you may have trouble fitting it next to your PC on a crowded desk. It's actually large enough to place under most monitor stands, but the plastic case seems a little too thin to support a heavy monitor. Small rubber supports allow you to place the case vertically, but in that position it can be difficult to insert and remove discs—the case can slide around when you push the disc in.

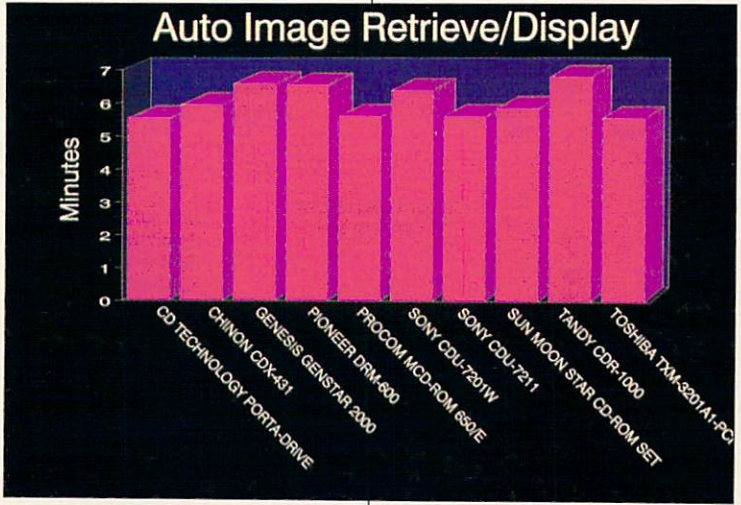
If you lack experience installing hardware and software or if you're just intimidated by such installations, you might want to call on an experienced friend for help. Depending on what other cards you have installed in your PC, you may find yourself changing jumpers on the board to alter its IRQ numbers and memory addresses, not an easy task for beginners. I found the software easier to install than the hardware, but because there's no installation program, I had to modify my CONFIG.SYS and AUTOEXEC.BAT files myself.

Procom's software and board also support SCSI hard drives, removable media drives, and two standard PC floppy drives; so this setup is a good choice if you need to attach other SCSI devices to your computer. Procom also includes drivers that allow you to use this CD-ROM drive on a Novell network.

Music lovers will appreciate *PlayCD,* an included program that you can use to play regular music CDs through the drive's headphone plug. While you're running *PlayCD,* you can program tracks in any order. It's even possible to listen to a CD while you're working with another program.

Although the documentation for the Procom MCD-ROM 650/E doesn't mention support for the Amiga, I was able to use the Mac cable and a third-party driver disk to connect the Procom drive to an Amiga and access the Fred Fish collection public domain disc and run a CDTV game. The Procom drive is definitely a good choice if you're a family with more than one kind of computer.

I didn't have any compatibility



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Circle Reader Service Number 195

problems with the MS-DOS CD-ROM discs that I tried on the Procom. If you're looking for a drive that has software support for the PC and Macintosh, and that can be used with other SCSI computers like the Amiga, the Procom drive is a good choice.

KIM HORN

Circle Reader Service Number 305

SONY CDU-7201W

SONY CORPORATION OF AMERICA
Computer Peripheral Products Company
655 River Oaks Pkwy.
San Jose, CA 95134
(800) 222-0878
List Price: $800
Street Price: $699
Warranty: one year, covering parts and labor
Service Plan: through calls or shipment to Sony service centers (listed on the warranty card)

The Sony CDU-7201W CD-ROM drive offers solid performance and some attractive features in a long, slim case less than half the width of most system boxes. And while CD-ROM technology isn't brand new, I couldn't help feeling just a bit like a kid at Christmas as I explored the capabilities of this CD-ROM drive.

The CDU-7201W performed without a hitch, whether the disc contained games, information about the Civil War, sounds, images, or just plain music (you can use it to play your audio CDs). The only problem I experienced—not enough memory for one of the games—was not the fault of the Sony drive at all. I was simply trying to load too many things into memory at once, a problem solved by creating a special boot disk for when I use the CDU-7201W.

On the front of the drive, you'll find a jack for headphones and a volume wheel, as well as an eject button, an emergency eject hole, the caddy insertion slot, and a light to tell you when disc access occurs. I did wish for a light in front to indicate when the drive is on, though. Unless you power on all your computer equipment with an outlet strip, you'll need to check the power switch in back of the box to see if it's on. Behind the box you'll also find stereo phono jacks, DIP switches for assigning a drive number, a ground terminal, and two ports—one to connect you to the proprietary controller card and the other to daisychain with as many as three more drives.

Installing the card and the software to run it is fairly straightforward, thanks to good documentation. Sony gives you the option of installing to your hard drive or to a floppy. If you choose the former, the installation program will replace your startup files and rename the old ones, so I recommend installing to a floppy. Once the program is installed and you boot up, the software tells you what drive letter gives you access to the CDU-7201W. In my case, it's drive S (for Sony?).

There's also a fairly straightforward program allowing you to listen to audio CDs (but scant documentation for it). I like being able to listen to my Bach CD in background mode while using an application on one of my other drives. Thanks to the headphone jack, I can listen without disturbing nearby coworkers.

To protect the drive during transportation, Sony employs automatic locking of the optical pickup every time the caddy (the device that holds the disc) is ejected. Also, whenever you load or eject the caddy, the drive automatically cleans the objective lens of the optical pickup. This automatic maintenance proves particularly important when you realize that CD-ROM drives, unlike your stereo turntable and stylus, are not user serviceable. The laser beam used to access disc information could harm your eyes, so Sony cautions you not to open the drive's cabinet.

Sony has established itself as a leader in television and audio technologies. With its CD-ROM drives, Sony is well on the way to making quite a name for itself in computer technologies as well.

MIKE HUDNALL

Circle Reader Service Number 306

MANAGING YOUR MEMORY

Adding a peripheral such as a CD-ROM player can complicate memory management. If you're using DOS 4.01 and a mouse and if you have SHARE loaded, you'll sometimes have so little memory left after loading your CD-ROM driver that you can't run the CD-ROM applications. My experience has taught me to use a memory management program like *386Max*, *QEMM-386*, or *TurboEMS* to place device drivers into high memory areas. The Microsoft extensions will allow you to use extended memory, but even that option may not be enough to free your CD-ROM drivers for use. Another solution would be to update your DOS to version 5.0, which includes the capability of placing device drivers into upper memory blocks, leaving low memory free for applications.

—PETER SCISCO

SONY CORPORATION OF AMERICA
Computer Peripheral Products Company
655 River Oaks Pkwy.
San Jose, CA 95134
(800) 222-0878
List Price: $950
Street Price: $824
Warranty: one year, covering parts and labor
Service Plan: through calls or shipment to Sony service centers (listed on the warranty card)

SONY CDU-7211

CD-ROM technology is rapidly entering the world of computing. The drives, or players as they're sometimes called, can access enormous amounts of data from compact discs (CDs). They operate quietly, and though CD-ROM drives are slower than hard drives, their performance is quite acceptable. This is my first time using one, and I'm impressed with what they can do, as well as with what they can offer us in the computing world.

The unit I reviewed is a Sony model CDU-7211 SCSI CD-ROM drive. With it, I received Future Domain's TMC-850 SCSI adapter. Installation is fast and trouble-free. Plug the SCSI adapter card into a computer slot first. The manual that comes with the adapter clearly explains the setup procedure and provides easy-to-follow diagrams. Next, use the supplied cable to connect the CD-ROM drive to the SCSI adapter, and plug in the power cord.

The last step in the setup procedure is to install the software drivers, which are conveniently provided on both 3½- and 5¼-inch disks. To install the drivers, you simply run the SETUP program on the disk. Everything is taken care of for you. All the necessary files are copied, and changes are made to the AUTOEXEC .BAT and CONFIG.SYS files. When the program is finished, you're ready to go. That's all there is to it.

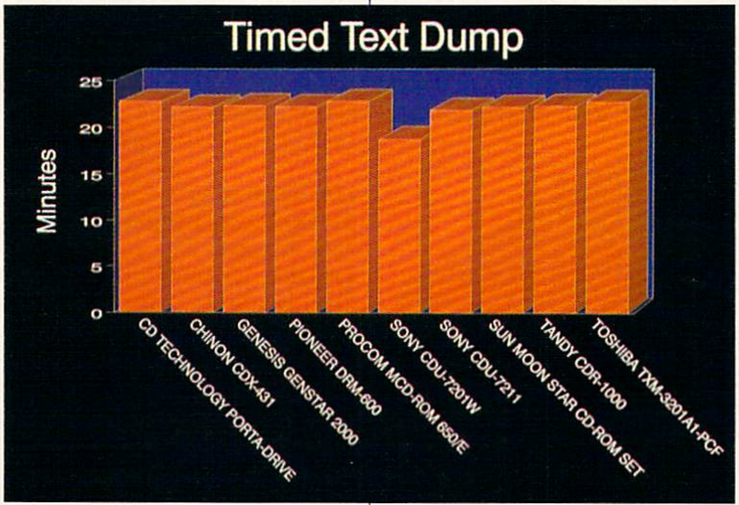
The CDU-7211 is a half-height drive, so it easily fits almost anywhere on your desktop. It features two SCSI bus connectors which conform to ANSI standards, allowing you to daisychain other SCSI devices. The controller has a 64K buffer memory. You place your disc in a caddy before inserting it in the slot in the front of the drive.

This CD-ROM drive is capable of audio playback and provides audio line outputs on the back and a stereo headphone jack on the front. You also get a program that allows you to play your music CDs on the drive. In addition to being able to eject a caddy with the eject button and an emergency eject hole on the front of the unit, you can also use an eject program to eject the disc using only a software command.

If you're considering a CD-ROM drive, the Sony package is a good choice. It contains everything you need to get started except CDs. It's very easy to install, and since it's a Sony, you can bet that it'll be around for a long time.

TROY TUCKER

Circle Reader Service Number 307



UNDERSTANDING THE TIMED TEXT DUMP

How quickly can these CD-ROM drives handle text? The Timed Text Dump Test uses our *TIME_IT* program to show the actual elapsed time in minutes, seconds, and hundredths of seconds required to "type" a huge text file (2,551,206 bytes) from a CD-ROM disc file to the PC screen. The source file is PHRASE.CON from Alde Publishing's *The Amazing Moby Lexicon* CD.

—TOM BENFORD, PRESIDENT
COMPUTER PRODUCT
TESTING SERVICES

SUN MOON STAR CD-ROM SET

If you're looking for a capable CD-ROM drive with an impressive bundle of discs, you owe it to yourself to check out Sun Moon Star's CD-ROM Set.

Connecting the drive to the computer was a breeze, but installing the software proved more of a challenge. The installation process alters your CONFIG.SYS and AUTOEXEC.BAT files, and this seemed to be where my problems were. Luckily, the manual explains what you should find when you examine these files, and I found that the default base address of the controller card was the same as the address for another of my peripherals. To correct the problem, I used one of the card's eight jumper settings for different addresses.

I placed the drive between my system box and the monitor to save space on my crowded desk—a convenient setup. The only other challenge I faced in setting up this drive involved the drive door, which apparently popped out of place during shipping. I managed to fish it out easily, however, and loaded and ejected discs normally without the door.

Once I had the drive up and running, trying out the software bundled with the Sun Moon Star was as exciting as opening packages on Christmas morning.

CHOOSING AN INTERFACE

An interface card lets your CD-ROM drive communicate with the host PC, but which kind of card should you choose?

The decision between a SCSI (Small Computer Systems Interface—called scuzzy for short) and a proprietary interface is a personal one, since many manufacturers offer their drives interfaced either way. For example, the Hitachi CDR-3600 comes with a Hitachi proprietary interface, while the Hitachi CDR-3650 (virtually the same drive except for buffer size) is configured for a SCSI interface. Proprietary interfaces are commonly sold separately, adding to the cost of the drive (typically $100–$150 more). The SCSI interface allows daisychaining of up to eight SCSI devices, such as additional CD-ROM drives or hard drives, all using the same single interface card. It's not uncommon, however, to have daisychaining capability with many proprietary-interface drives as well. For example, the Sony proprietary bus allows for daisychaining four CD-ROM drives.

Performance differences between the proprietary and SCSI models of the same drive are negligible (if any exist at all), and in some cases, the proprietary interface actually performs better since it is a custom fit rather than a universal solution.

The "mated pair" proprietary approach very often optimizes the features of a particular drive, such as internal buffer size, and extracts the best performance from both the interface card and the CD-ROM drive itself. The installation/setup procedure is often highly automated with proprietary-interface drives as well.

The SCSI interface provides a standard that is ostensibly hardware independent, thus allowing dealers to sell the same CD-ROM drive to a Macintosh owner (since the Mac has its own built-in SCSI port) or to a PC owner with a SCSI interface kit. Several external drives are *only* available as SCSI models, so that should be taken into consideration when shopping for a drive.

—TOM BENFORD

One disc contains popular games from the Software Toolworks: *Black Hole, Life & Death, Bruce Lee Lives, Chessmaster 2000, Gin King/Cribbage King, Hunt for Red October, Bad Street Brawler, Crossword Mania, 221B Baker Street,* and *Alternate Reality: The City.* Also from Toolworks you'll find *World Atlas* and *Illustrated Encyclopedia.* Both are topnotch, fun-to-use reference works.

You also get *Microsoft Bookshelf,* which includes *The American Heritage Dictionary, Roget's II: Electronic Thesaurus, The World Book* and *Book of Facts, Bartlett's Familiar Quotations,* and half a dozen other reference aids to writers. Microsoft's *Small Business Consultant & Stat Pack* comes with the package, too.

POWER
CD-ROM
Sun Moon Star

SUN MOON STAR
Personal Computer Division
1941 Ringwood Ave.
San Jose, CA 95131
(408) 452-7811
List Price: $995.00
Street Price: $725.67
Warranty: 18 months mail-in (extended warranty available)
Service Plan: through tech support, or shipping a part or the entire system to the company

These programs provide a library of government publications and statistics, ranging from weekly wage averages in 60 different communities to affirmative action plans, from agricultural commodities to federal regulations, and much more.

Hot Line lets you dial more than 132,000 corporate and government telephone numbers at the touch of a key. And with *Hot Line,* you can find area codes for more than 3,000 cities worldwide with the electronic phone book and automatic dialer.

Music fans will appreciate *CD Guide,* an up-to-date listing of almost everything that has to do with CD music.

The Sun Moon Star comes with an earphone jack and volume control that make it convenient for listening to your favorite musical disc while working at your computer.

In all, despite its large footprint and somewhat flimsy door, the Sun Moon Star CD-ROM drive works well and faster than I expected. The amount of software that accompanies this drive is truly awesome, making the total value of this package something to consider when shopping for a CD-ROM drive.

TOM NETSEL

Circle Reader Service Number 308

UNDERSTANDING THE HI-RES COLOR IMAGE RETRIEVAL TEST

The Hi-Res Color Image Retrieval Test shows the actual elapsed time, in seconds and hundredths of seconds, required to retrieve three high-resolution scanned color images. Each bar represents an average of three image retrieval times. U.S. postage stamps from Nimbus Information Systems' *Romware Magazine* CD are the source of images used in this test.

—TOM BENFORD, PRESIDENT
COMPUTER PRODUCT TESTING SERVICES

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700 One Tandy Center
Fort Worth, TX 76102
(817) 390-3300
List Price: $399.95
Street Price: n/a
Warranty: one year, covering parts and labor
Service Plan: through retail outlets

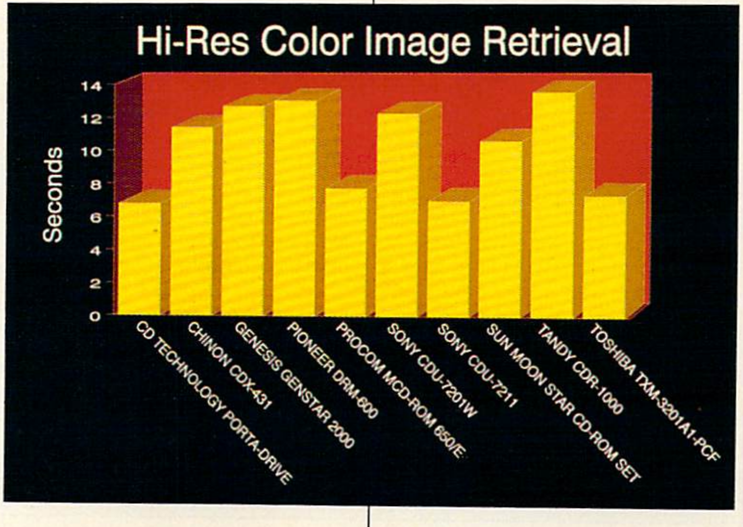
TANDY CDR-1000

The Tandy CDR-1000 CD-ROM is easy to install if you have a spare 5¼-inch half-height bay in your PC, an empty slot in your expansion bus, a Phillips-head screwdriver, and an adventurous spirit. (If you have all but the screwdriver or the adventurous spirit, your local Radio Shack will install the CD-ROM for you.)

It provides the advantages of CD-ROM for a bargain price of only $399.95. Tandy isn't known for its price leadership, preferring to make a name for itself providing the widest availability of products and service. Still, the under-$400.00 price is a breakthrough, particularly when you consider that this CD drive is one of the few that meet or exceed Microsoft's multimedia standard of 150K per second data transmission.

Though the data transmission is very rapid, the CDR-1000 access time is 800 milliseconds—almost a full second to find a particular piece of data on the CD, which means that if you are using your CD for heavy-duty database access, you should look for a faster (and more expensive) unit. Since the CDR-1000's forte is streaming information quickly to the computer once it is found, it's particularly suited to playing games and other applications where animation is important.

To load a CD, you slide the entire unit forward like a bureau drawer. When it's nearly all the way out of the machine, you can lift a



hinged lid to expose the CD area. Unlike many CD-ROMs, the CDR-1000 doesn't use a CD caddy. You simply place the CD in the unit as you would in a portable CD player. One less piece of cyberjunk to clutter your office.

Recognizing that the CDR-1000 will be the first upgrade many users make to their basic machine, Tandy put the manual/installation guide together with the novice in mind. It covers installation and use of the CD-ROM very gradually in step-by-step procedures.

The CDR-1000 is capable of playing audio CDs as well as reading data CDs. It features a headphone minijack and volume control in the front panel. The back of the expansion card features two female RCA jacks, allowing you to connect the player to your stereo. The audio CD can be controlled from the command line or from the control panel that supports a mouse. It will continue to play when you start up another application, so you won't have to make a choice between playing music and using your computer productively.

The performance, features, and price of Tandy's CDR-1000 are sure to attract attention in today's increasingly important CD-ROM drive market.

ROBERT BIXBY

Circle Reader Service Number 309

**TOSHIBA AMERICA
INFORMATION SYSTEMS
Disk Products Division
9740 Irvine Blvd.
Irvine, CA 92718
(714) 583-3000
List Price: $950.00
Street Price: $685.67
Warranty: one year
Service Plan: through return
of drive to the company**

TOSHIBA TXM-3201A1-PCF

Now's a great time to buy a CD-ROM drive. By the time you read this, Microsoft will have released its multimedia extensions for *Windows,* and the number of new CD-ROM titles will be growing exponentially. Manufacturers are falling all over each other as they try to gain the edge on price and features.

If you're the kind of person who buys conservatively—who wants a product to have a proven track record before you'll consider buying it—take a good look at Toshiba's TXM-3201A1-PCF. It's considered by many to be the workhorse of the currently available CD-ROM drives and is one of the first drives that fully meet Microsoft's multimedia specifications.

It's also a highly versatile drive—you can buy an internal version (XM-3201B, $600) or an external version, and the external version is available with either a PC interface kit (TXM-3201A1-PCF, $950) or a Mac interface kit (TXM-3201A1-MAC, $850). The PC kit includes a SCSI card and requires an available slot, but you can also plug the TXM-3201 into a standard parallel port with a MiniSCSI (Trantor Systems, 5415 Randall Place, Fremont, California 94538; 415-770-1400; $179).

If you're new to CD-ROM drives, you'll appreciate that this one is easy to install. You simply run a setup program that writes the necessary drivers to your hard drive and adds a few lines to your AUTOEXEC.BAT and CONFIG.SYS files. The PC interface kit is manufactured by Future Domain for Toshiba and includes a half-slot SCSI adapter card and a special SCSI cable. A word of warning—although the Future Domain SCSI cable looks like a standard Macintosh SCSI cable, it isn't wired the same way. If you

THE HISTORY OF SCSI

SCSI was originally based on the architecture of the block-multiplex channel commonly used on the early IBM mainframe computers. This channel had the ability to communicate with several peripherals simultaneously. The SCSI specification for personal computers was approved in 1986 (ANSI X3.131-1986). After Apple's and Commodore's adoption of SCSI, IBM finally offered a SCSI bus as standard equipment on some PS/2 models in 1989.

The SCSI standard has provided outlines for several commands pertaining to different device types such as hard drives, printers, and tape backups. It also defined physical characteristics such as pin assignments and cable types. While it all looked good on paper, in reality there were often conflicts when several SCSI-interfaced peripherals were simultaneously accessed. The main problem stemmed from too much flexibility in the specification. The result—some peripherals significantly deviated from what was intended to be a "standard." Device conflicts and compatibility problems cropped up frequently.

—TOM BENFORD

All Benchmark/Performance Testing is conducted by Computer Product Testing Services (CPTS), an independent testing and evaluation laboratory based in Manasquan, New Jersey. Every effort has been made to ensure the accuracy and completeness of this data as of the date of testing. Performance may vary among samples.

hook the cable to a Mac, you could damage your computer.

The drive worked fine with every CD-ROM disc that I tried—there was never any loss of data, the sound was clear and steady (a stereo headphone jack is located on the front of the unit), and the SCSI software drivers were always able to locate the drive.

It's not covered well in the manual, but you can also play audio CDs on the TXM-3201. In order to do this, you have to set the last DIP switch (in the back of the unit) to the up position. Place an audio-CD disk in the caddy—just as you would a CD-ROM disk. To move to the next audio track, press the Open/Close button for less than a second. Unfortunately, you can't go backwards or move randomly through the tracks. To eject the disk, press the Open/Close button for more than a second.

For a solid and reliable CD-ROM drive that has weathered the test of time, Toshiba's TXM-3201A1-PCF is an excellent choice.

DAVID ENGLISH

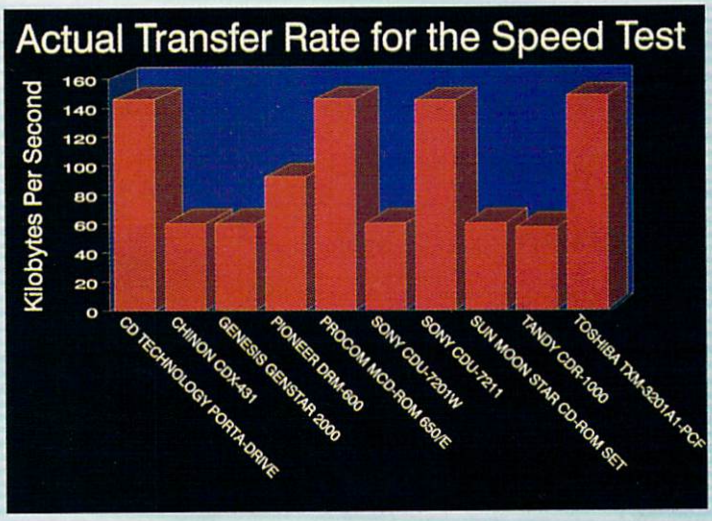
Circle Reader Service Number 310

SCSI-2

SCSI-2 (still a draft as of this writing—not yet an officially adopted standard) seeks to alleviate compatability problems by providing more stringent hardware design guidelines, additional device commands, better error handling and recovery, and enhanced logic for signal routing and device sharing. It should be noted that not all SCSI adapter cards can support newer peripherals built to conform with SCSI-2 protocols, so check the compatibility with your dealer before purchasing to avoid problems and headaches.

If you'd like more information on SCSI and SCSI-2, you can contact ANSI (American National Standards Institute), 1430 Broadway, New York, New York 10018.

—TOM BENFORD



UNDERSTANDING THE SPEED TESTS

We ran these and the other tests using a 16-MHz 386 SX with 2MB RAM and a 512K VGA card attached to a high-resolution monitor.

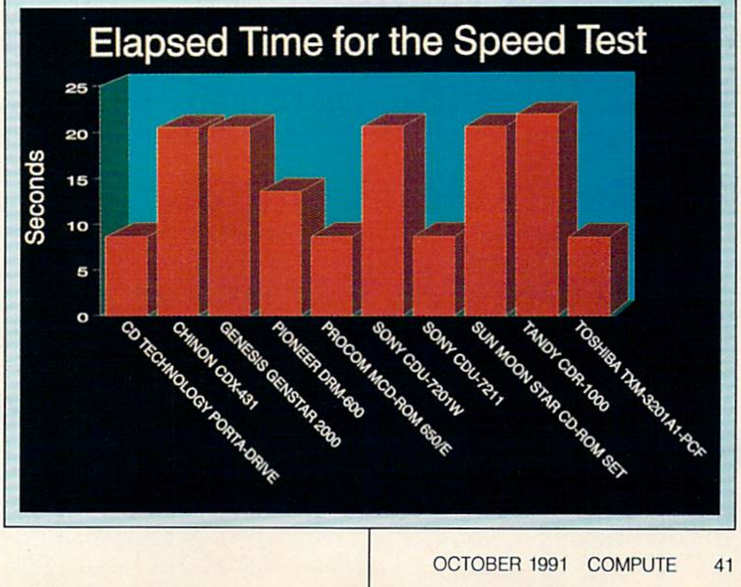
The speed tests provide two kinds of statistically significant data: the actual transfer rate of the CD-ROM system and the elapsed time for a transfer of a CD-ROM file to the screen.

Here's how the tests worked. We transferred the CAPTIONS.NAM file (1,257,344 bytes) on the *Compton's Multimedia Encyclopedia* disc to the screen using our *CD-SPEED* program while at the same time running our *TIME_IT* program (a stopwatch program).

The bar graph for actual transfer rates shows the speeds achieved by particular drives as they transferred the CAPTIONS.NAM file to the screen in 16K blocks. The industry standard transfer rate is 150K per second. There are differences in these actual rates because of differences in controller technologies, buffers, and software.

The elapsed time bar graph shows how long it took to make the transfer.

—TOM BENFORD, PRESIDENT
COMPUTER PRODUCT
TESTING SERVICES



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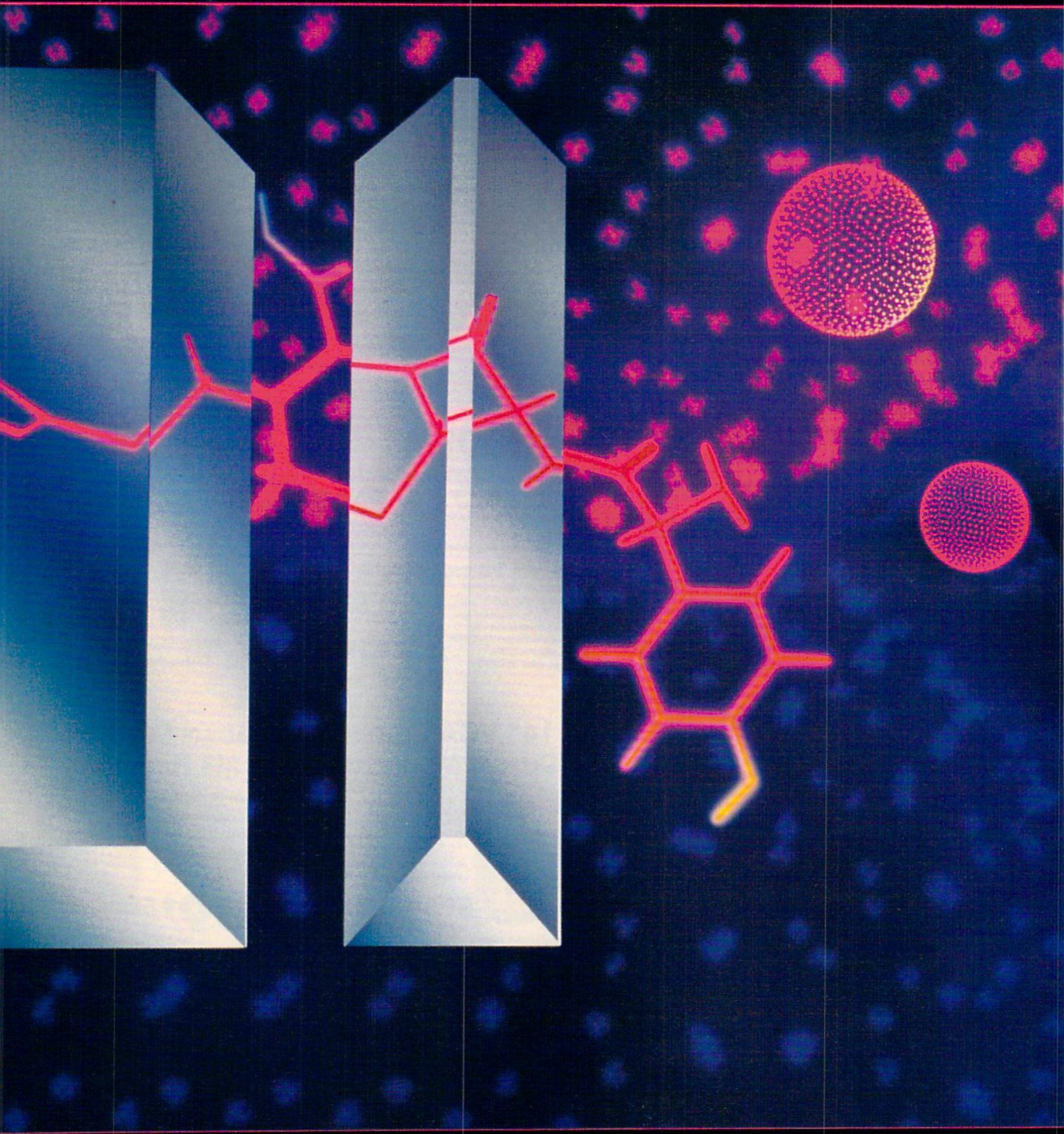

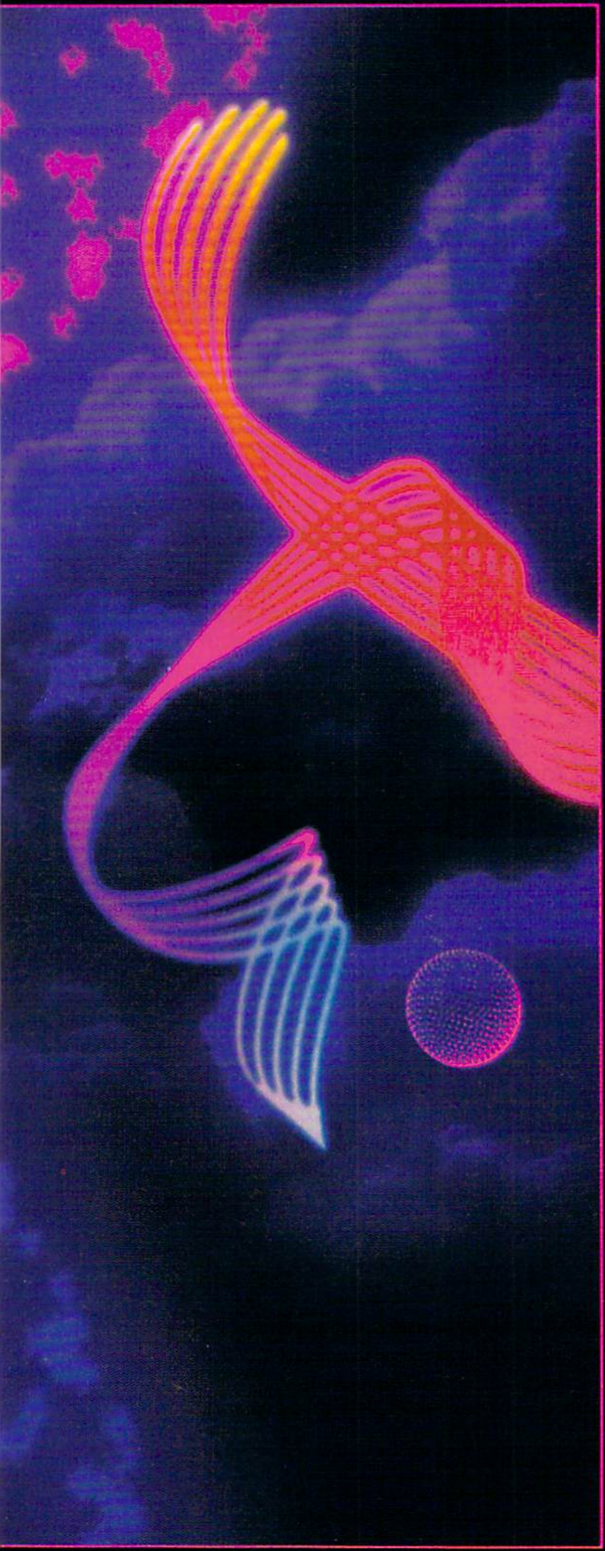

It's easy
to protect yourself
against
computer viruses.
Here's how.

COMPUTER VIRUSES FROM A TO Z

By Mark Minasi

You've heard about computer viruses—those mysterious, malevolent programs that enter your computer in the dead of night and zap all of your data. Some virus experts say we'll see thousands of different viruses floating around the computer world in the next few years. Like Chicken Little, these pundits predict the computer sky will fall, ending computing as we know it. Others say that these virus experts *need* users to be afflicted with virus hysteria so they can keep their jobs. What's going on? Here's the who, what, why, where, and how of viruses.

Virus is a term in popular use that refers to any of a group of unwanted programs—the weeds in your computer garden. By the way, the term is a metaphor only—you can't catch a virus from your computer.

Why are there viruses? Simply put, a virus is a form of computer crime, and often it's not even a particularly inspired crime. Microcomputing has grown up in an atmosphere of trust and cooperation, freeing PC operating environments from the clutter of security systems—much like a rural neighborhood that hasn't had to lock its doors for years.

This open environment has left an opportunity for a few cowardly programmers to create these destructive programs. Believe me—there's not much to writing a virus that runs on DOS machines. There's no more ingenuity in writing one of these than there would be in robbing houses in the aforementioned neighborhood.

The media-inspired vision of virus authors as a class of super programmers is misinformed. They're just maladjusted twerps looking for some attention in a particularly destructive way.

Parts of a Virus

A virus has two parts, which I'll call the infector and the detonator. They have two very different jobs. One of the features of a computer virus that separates it from other kinds of computer programs is that it replicates itself so that it can spread (via floppies transported from computer to computer, or networks) to other computers. That's what the infector does.

After the infector has copied the virus elsewhere, the detonator performs the virus's main work. Generally that work is either damaging data on your disks, altering what you see on your computer display, or doing something else that interferes with the normal use of your computer.

Here's an example of a simple virus, the Lehigh virus. The infector portion of Lehigh replicates by attaching a copy of itself to COMMAND.COM (an important part of DOS), enlarging it by about 1000 bytes.

So let's say you put a floppy containing COMMAND.COM into an infected PC at your office—that is, a PC that is running the Lehigh program. The infector portion of Lehigh looks over DOS's shoulder, monitoring all floppy accesses. The first time you tell the infected PC to access your floppy drive, the Lehigh infector notices the copy of COMMAND.COM on the floppy and adds a copy of itself to that file.

Then you take the floppy home to your PC and boot from the floppy. (In this case, you've got to boot from the floppy in order for the virus to take effect, since you may have many copies of COMMAND.COM on your hard and floppy disks, but DOS only uses the COMMAND.COM located on the boot drive.)

Now the virus has silently and instantly been installed in your PC's memory. Every time you access a hard disk subdirectory or a floppy disk containing COMMAND.COM, the virus sees that file and infects it, in the hopes that this particular COMMAND.COM will be used on a boot disk on some computer someday.

Meanwhile, Lehigh keeps a count of infections. Once it's infected four copies of COMMAND.COM, the detonator is triggered. The detonator in Lehigh is a simple one. It erases a vital part of your hard disk, making the files on that part of the disk no longer accessible. You grumble and set about rebuilding your work, unaware that Lehigh is waiting to infect other unsuspecting computers if you boot from one of those four infected floppies!

The Worm That Turned

The term for any program that replicates itself, like the infector part of a virus, is a *worm*. Some viruses are pure worms, like the much-publicized Internet worm. This worm ran on minicomputers linked on the Internet network. It made multiple copies of itself in a minicomputer, forcing the computer to waste time executing the worms, slowing down response time for legitimate users. It also copied itself to other computers on Internet, spreading so quickly that it brought the entire network to a halt.

Such a program will not affect PC users, since there are no PC-based networks that can call your computer up and dump messages on it automatically. The kinds of worms found in viruses generally work by injecting copies of themselves into executable programs.

This one fact simplifies the task of antivirus programs. A virus can only infect either an executable program—ones with a COM, EXE, SYS, BIN, or OVL extension—or the area of a disk called the boot sector. We can then talk about two kinds of viruses: program infectors and boot sector infectors.

DOS Boot

A boot sector is a program and data area on a disk that contains a small program that is essential to the initial bootup process. The unusual thing about the boot sector is that it is not a file. In fact, it lies completely outside the part of the disk that contains files.

The only way to become infected from a boot sector infector virus is to boot from an infected floppy. Think about that for a moment. The only disk you should ever boot from anyway is the original DOS floppy, and that's write-protected, so it couldn't contain a virus unless the Microsoft original was infected. You really never have to boot from any other floppies except for a few old games, so being careful not to boot from floppies is one simple way to avoid virus infections.

That simple advice is quite powerful. More than 70 percent of the viruses out there are boot sector infectors rather than program infectors. Of the five most common viruses found in the U.S., three are boot sector infectors.

Merely making a habit of keeping the floppy drive door open when you boot will instantly make you invulnerable to more than half the viruses out there. (What should you do about the other kind, the program infectors? They're a bit tougher, so hang on for a few more column inches, and I'll get to them.)

Whether a boot sector or program infector, all infectors' modi operandi are similar. When you turn your computer on, the virus is not active until the infected portion is loaded. In the case of a boot sector infector, that's immediately upon boot-up, since that's when the boot sector is executed.

For a program infector, the virus becomes active when you run the infected program. For example, if *1-2-3* were the only infected program on your PC, the virus would only be active from the time you ran *1-2-3* until you turned the PC off.

Once active, the virus looks for programs or boot sectors to infect. While your hard disk has only one boot sector, a program infector may slowly infect every program on your hard disk. Boot sector infectors will infect boot sectors on floppies inserted in your floppy drives, and program infectors will infect any programs on those floppies. The infection process—a sort of COPY command—is very quick, and it generally won't be noticed by the PC's operator.

Note that because viruses can only be spread by booting from floppies with infected boot sectors or by running infected programs, you cannot become infected by a data file—that is, a *1-2-3* spreadsheet, a *WordPerfect* document, or a *dBASE* database cannot spread viruses.

Tick, Tick, Tick

The detonator is usually called a time bomb or logic bomb. It's a piece of code embedded in a program or the operating system itself that waits for a particular event to occur. When that event occurs, the bomb goes off, doing some kind of damage.

Logic bombs have been around nearly since the beginning of computing. An early one showed up in a mainframe payroll program. The program's creator had inserted a clause in the payroll program that said, in effect, "If you find I'm not on the payroll, erase all payroll files."

A time bomb is based on a related idea, but it detonates according to the clock. For example, the detonator portion of the most common virus in the U.S., one called Jerusalem-B, goes off every Friday the 13th. Whenever you try to run a program, it erases the program instead. On other days, it only does minor annoying things to your screen. The detonator program in the Lehigh example is a logic bomb. It says, "Once you've made four copies, do the damage."

Many detonators are fairly harmless, although an annoying intrusion on the use of your PC. The Cascade virus causes letters on your screen to fall to the bottom of the screen. No data's been damaged, but it does make using the computer difficult.

The New Zealand virus, also known as Stoned or Marijuana, occasionally keeps your computer from booting, displaying the message *Your PC is now Stoned.* (There's also a message in the virus saying, *Legalize Marijuana,* but due to a bug in the virus, this message never gets displayed.)

The Fu Manchu virus makes childish, obscene comments whenever you type *Reagan, Thatcher,* or *Botha.*

Yankee Doodle, from Bulgaria, plays "Yankee Doodle" on the PC

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speaker at 5:00 p.m.—freeing the workers, as it were.

Bouncing Ball or Italian causes a character to dislodge itself from its original location on the screen and bounce around the screen, *Pong*-style. A few viruses have no apparent detonators at all, making them pure worms.

Other detonators are quite destructive. Erasing the FAT is a popular virus pastime. Additionally, the extra time required by the infection process when performing disk reads or writes may cause some PCs to erroneously report a timeout error on the floppy drive.

If you'd like to see what some of the flashier viruses look like, get a copy of VIRSIMUL.ZIP, a harmless simulation of several viruses. You can find it on the bulletin board of the National Computer Security Association (NCSA). NCSA's BBS number is (202) 364-1304; its voice number is (202) 364-8252. NCSA also sells books on viruses and computer security.

Vectors of Infection

First of all, don't worry too much about viruses. You may never see one. There are just a few ways to become infected that you should be aware of. The sources seem to be service people, pirated games, putting floppies in publicly available PCs without write-protect tabs, commercial software (rarely), and software distributed over computer bulletin board systems (also quite rarely, despite media misinformation).

Call up computer repairpersons, and what's the first thing they'll probably do? Boot your system from a diagnostic disk. I've seen three cases in the past year of clients being infected by third-party service people with diagnostic disks that were infected. Of course, the serviceperson didn't know the disks were infected. But be sure to ask that any service personnel run their diagnostic disks through a virus checker like *VIRUSCAN* (I'll discuss virus checkers in a minute) before putting them in your machine.

Many viruses have spread through pirated—illegally copied or broken—games. This is easy to avoid. Pay for your games, fair and square. I've toured many software companies, and believe me—these are not large faceless corporations. Most are small operations with fewer than thirty employees.

If you use a shared PC or a PC that has public access, such as one in a college PC lab or a library, be very careful about putting floppies into that PC's drives without a write-protect tab. Carry a virus-checking program and scan the PC before letting it write data onto your floppies.

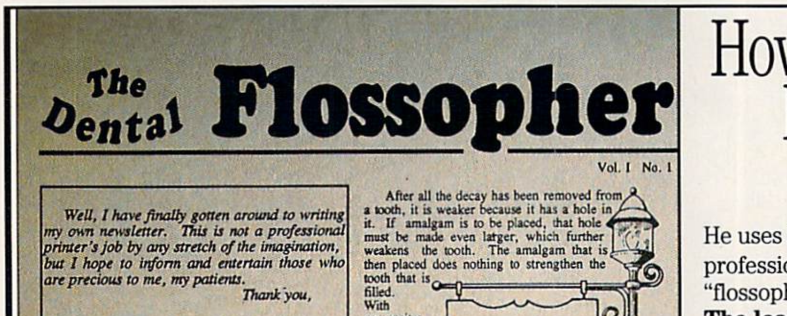
Despite all the media hype, computer BBS systems are usually free of viruses. To be really sure, you could download files only from big services like BIX, GEnie, or CompuServe.

Now and then you'll see viruses accidentally included with shrink-wrapped software. Scary as that sounds, it's not really something to worry about—the number of cases of that in the PC world can be counted on one hand, with fingers left over.

Search and Destroy

Despite the low incidence of actual viruses, it can't hurt to run a virus checking program now and then. There are actually two kinds of antivirus programs: virus shields, which detect viruses as they are infecting your PC, and virus scanners, which detect viruses once they've infected you.

Virus shields sound attractive—keeping the virus from infecting your PC in the first place—but they suffer from a major flaw that makes them useless in many cases. There's no real way to detect virus behavior; a shield can only detect *viruslike* behavior, such as soft-



The Dental Flossopher

Vol. I No. 1

Well, I have finally gotten around to writing my own newsletter. This is not a professional printer's job by any stretch of the imagination, but I hope to inform and entertain those who are precious to me, my patients.

Thank you,

Dr. Jeff Ausen

Something to Cheer About?

I think so, but that is the question surrounding the current debate in dentistry over whether amalgam

After all the decay has been removed from a tooth, it is weaker because it has a hole in it. If amalgam is to be placed, that hole must be made even larger, which further weakens the tooth. The amalgam that is then placed does nothing to strengthen the tooth that is filled.

With composites the opposite is true. In fact, because composites are bonded into place the finished restored tooth is stronger than it was before it was decayed! In other words, the result is stronger

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amalgam outlawed. There have even been demonstrations and marches promoting such a ban. In this country there are presently 14 states that have had,

1

Winter 1991

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Circle Reader Service Number 199

ware that directly controls your disk hardware. Unfortunately, there is a lot of legitimate software that directly controls disk hardware, leading to many annoying false alarms. After a while, you'll get tired of the false alarms, and you'll get rid of the software.

Virus scanners, however, are much more convenient. You just run them now and then, and they detect any viruses that your disks are harboring. There are two potential problems with scanners, but both are surmountable.

The first is the sheer number of viruses out there—more than 500, at last count. A virus scanner must be able to detect any of these monsters, a process that makes scanners big, slow, and potentially expensive. At minimum, it means that you'll be buying updates to your virus scanner program a few times per year.

This issue of *COMPUTE's PC Disk* contains a terrific scanner from McAfee Associates, a California firm specializing in antivirus information, software, and consulting. Its program is called *VIRUSCAN,* and it's now at version 77. You can be sure that the McAfee folks stay on top of this market!

For more information on *PC Disk,* see "On Disk" elsewhere in this issue. McAfee requests a $25 registration fee for the use of *VIRUSCAN* if you're a household or home office business—not an unreasonable price for a little computer peace of mind.

Larger businesses and government agencies must get in touch with McAfee to negotiate a registration fee. You can reach McAfee at (408) 988-3832 (voice), or you can get *VIRUSCAN* directly from its BBS at (408) 988-4004.

The second potential problem for virus scanners comes from a class of viruses called stealth viruses. In order for a virus to exist on a PC, it must reside somewhere, generally in the boot sector or a program file on the PC's hard disk. So virus scanners look in those areas for distinctive signatures that characterize particular viruses.

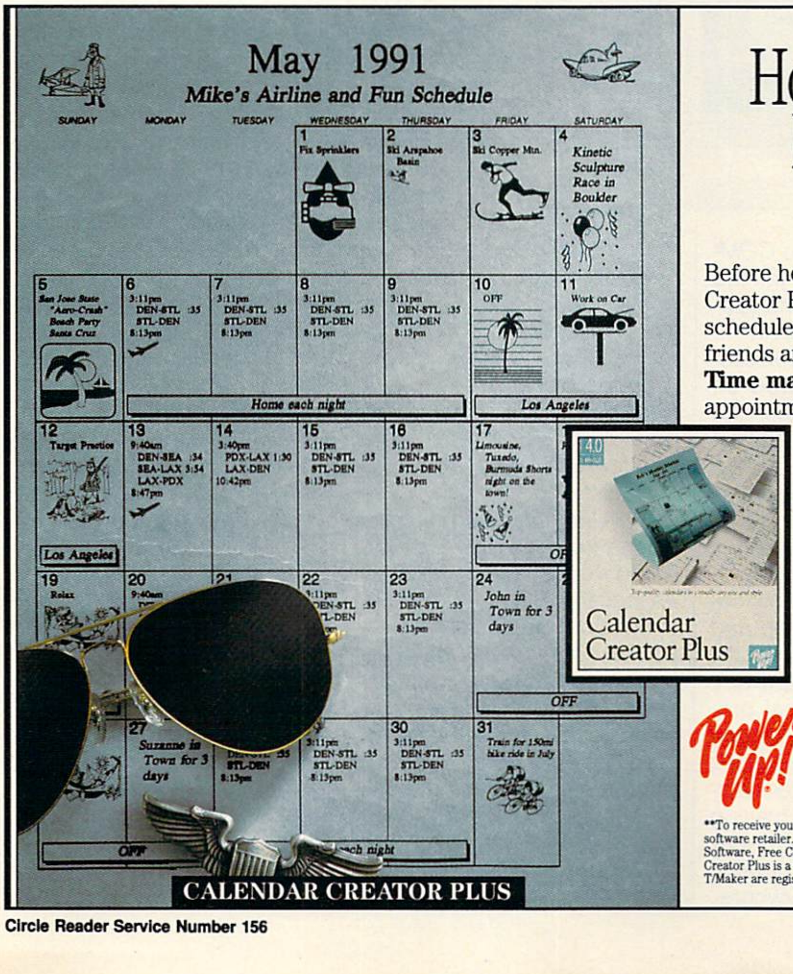
But stealth viruses foil scanners. They monitor attempts to read the part of the disk that the virus lives in. They then intercept the read attempt and hand the scanner program the image of the disk as it would be if it weren't infected. "Nobody here but us chickens," the stealth virus says.

How do you get around stealth? Simple. Stealth only works if the virus is active—if it's been loaded from the infected hard disk. Just cold-boot from a write-protected floppy before running any virus scanner, and you're safe from stealth. Ensure that the boot floppy was made with DISKCOPY using your original write-protected DOS startup disk after cold-booting from that original startup disk.

What do you do if you find that you are infected? If a program file is infected, simply erase it from your hard disk and restore a clean copy from your backups. If you have an infected boot sector, most virus scanners will create a clean, uninfected boot sector, eliminating the virus; if worst comes to worst, you could remove an infected boot sector by backing up your disk, then low-level formatting, partitioning, and high-level formatting the disk, although measures that drastic shouldn't be necessary.

Viruses are something to worry about, but not a lot. A little common sense and the occasional virus scan will keep you virus-free. Remember these four points:

- Viruses can't infect a data or text file.
- Before running an antivirus program, be sure to cold-boot from a write-protected floppy.
- Don't boot from floppies except reliable DOS disks or your original production disks.
- Stay away from pirated software. ❐



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Circle Reader Service Number 156

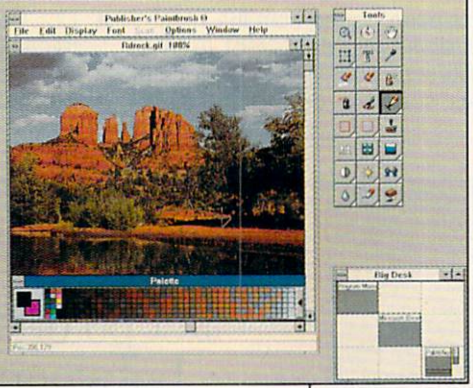
ON DISK

Tony Roberts

DEBUG YOUR COMPUTER WITH VIRUSCAN

This issue's edition of *COMPUTE's PC Disk* includes a variety of programs that nearly everyone will find useful. These programs were selected from among hundreds we downloaded from bulletin boards and online services.

You can get all the programs on this month's disk or subscribe to a year's worth of *COMPUTE's PC Disk* (which includes a subscription to *COMPUTE*) by sending in the coupon you'll find on the second page of this column.



The wide open spaces are yours with Big Desk. It turns your Windows desktop into a huge virtual workspace that's eight screens wide by eight screens high.

Please note that the shareware programs featured on our disks are yours to test and evaluate, but if you find the programs useful, you should send the registration fee to the author.

Registering shareware has several benefits. First, registered owners receive notification of program updates and often are entitled to free upgrades. Also, many shareware authors send additional programs as a bonus when you register. Finally, by supporting shareware authors, you encourage them to continue making high-quality, low-cost, try-before-you-buy software available for PC users everywhere.

VIRUSCAN

In every facet of our lives these days, we're forced to be more security conscious. Computers are no exception, especially if they hold thousands of dollars' worth of data or hundreds of hours' worth of your work.

You can read all about computer security in this issue's feature called "Viruses From A to Z" by Mark Minasi on page 44. With *VIRUSCAN* you can take the first steps to protect yourself against possible disaster.

VIRUSCAN, from McAfee Associates, is one of the most widely respected virus detection utilities available today. This program checks your disks for the presence of more than 243 known computer viruses. McAfee works hard to continually update the software to identify newly discovered viruses.

With options for checking files, disks, or memory for viruses, *VIRUSCAN* also sets exit codes, so you can run it from batch files, and its reports can be directed to data files for later reference.

Registration for home use of *VIRUSCAN* is $25 and includes free downloads of updated versions from McAfee Associates' BBS for one year. In addition, McAfee offers registered home users free information on removing viruses.

If you trade disks with your friends or associates, or download files from bulletin boards, you increase the risk of introducing a virus into your system. Running *VIRUSCAN* regularly can eliminate your fears that a hidden virus may lurk within your PC. The small registration fee is well worth that peace of mind.

Useful Notes

Here's an information manager that can help you organize the scraps of paper that accumulate on your desk and in your pockets.

Useful Notes, which can run as a stand-alone program or as a memory-resident utility, could be described as a freeform database of computerized Post-it Notes. Notes can range in size from a word or two to thousands of characters.

Need to remember a phone number? Create a note and jot it down. Keep doing this, and soon you'll have a pile of notes that you can sort, edit, and organize. If *Useful Notes* is running memory resident, you can pop it up with a keystroke, locate that phone number, and pop back to your main application in a flash.

Useful Notes allows you to create as many piles of notes as you like, so you can separate business notes from home notes; or if you share your computer, you can separate Mary's notes from Tom's.

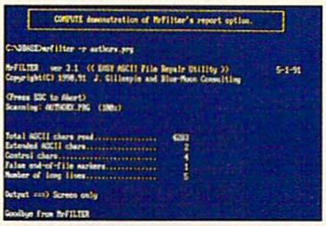
Michael Gardi's *Useful Notes* is shareware and carries a $20 registration fee. Registered users receive an update with the most recent version of the program, plus a version of *Useful Notes* that includes EMS support.

Mr. Filter

This is a program for the toolbox. You won't need *Mr. Filter* every day, but you'll be glad it's there when you do need it. Programmer Jim Gillespie describes *Mr. Filter* as "the first line of defense in dealing with corrupted text files." His goal was to create a quick and easy way to fix files that won't print or can't be called up in your word processor.

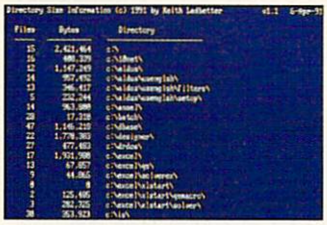
Mr. Filter removes false end-of-file markers, deletes extraneous control characters, and wraps lines longer than 80 characters. There are also options to remove extended ASCII characters and to strip high bits.

Mr. Filter works by reading an input file, scanning every byte, making its adjustments, and writing a new output file, leaving the original unchanged. The program also contains a report-only option that scans a file and reports on problems it finds.

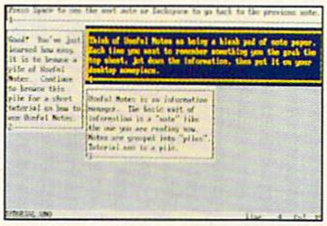


```
COMPUTE demonstration of MrFilter's report option.

C:\BASIC>mrfilter -r authors.prg

MrFILTER   ver 2.1  (( EASY ASCII File Repair Utility ))        5-1-91
Copyright(C) 1990,91  J. Gillespie and Blue-Moon Consulting

(Press ESC to Abort)
Scanning: AUTHORS.PRG  (100%)

Total ASCII chars read................   [illegible]
Extended ASCII chars..................      2
Control chars.........................      4
False end-of-file markers.............      1
Number of long lines..................      5

Output ===> Screen only

Goodbye from MrFILTER
```

Mr. Filter



Directory Size



Useful Notes

If you use *Mr. Filter,* you can register your copy with the author for $12. Next time you have a problem text file, you could grit your teeth, load a disk editor, and manually search for the problems, or you could just run the file through *Mr. Filter.*

Directory Size

This utility is so simple and so useful you'll wonder why it isn't part of DOS.

Directory Size paints a quick picture of your disk, letting you know the number of files stored in each subdirectory and the amount of disk space those files occupy.

When you're facing one of those "I've gotta make some room on this hard disk" sessions, *Directory Size* shows you where the fat is. It's like nutrition analysis for your PC.

Virginia programmer Keith Ledbetter, who has a large number of utility programs to his credit, offers *Directory Size* as a free program.

Big Desk

Here's a program that will help cure those overlapping windows blues for users of *Windows* 3.0. *Big Desk* creates a virtual desktop that allows you to spread out your applications neatly and hop from one to another.

Big Desk, written by Ian Heath of Southampton, England, permits you to configure a desktop that's as large as eight screens wide by eight screens high.

The program's icon shows a minimap of your virtual desktop, and with a click of the right mouse button, you can move from application to application effortlessly.

Big Desk is a shareware program. Your donation will help to fund programmer Heath's graduate studies at the University of Southampton.

If you find the program useful, please register it. The registration fee is 20 pounds sterling or about $35. Simon Phips, a colleague of Heath's, says not to be intimidated by currency exchanges—pay by credit card and let the people at VISA or MasterCard take care of the monetary details. ❐

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POINT & CLICK

Clifton Karnes

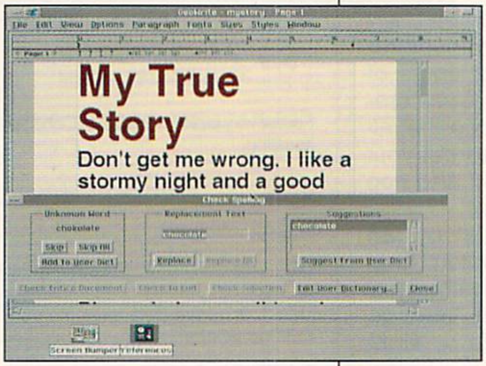
NEW ENSEMBLE, HOT NEW DOS

There's good news this month for *GeoWorks Ensemble* users. GeoWorks has released an update that adds features many of us have been waiting for (GeoWorks, 2150 Shattuck Avenue, Berkeley, California 94704; 415-644-0883).

The biggest story with *Ensemble* 1.2 is that *GeoWrite,* the program's word processor, has been transformed from a desk accessory into a full-fledged writing tool that comes with a search-and-replace engine and a 100,000-word spelling checker.

Both writers and designers will be glad to hear that printer support has been beefed up for this new release, too, with drivers for more than 300 additional printers.

GeoWorks shouts out one message loud and clear: Upgrade now!



My True Story

Don't get me wrong. I like a stormy night and a good

Unknown Word: chokolate

Replacement Text: chocolate

Suggestions: chocolate

Topping the list of other enhancements are an *Ensemble* version of the Russian game *Tetris,* more than 50 added icons for the DOS room, and more screen savers.

All this certainly sounds good, but here's the best news: This upgrade is being sent *free* to registered users of *Ensemble.* Now that's class! If you're a first-time buyer, the updated retail version, which lists for $199.99, should be available in stores by the time you read this.

We're going to be seeing more of *Ensemble* in the future. GeoWorks has announced deals with Laser Computer, Philips, Samsung, Everex, and others to bundle the package with these companies' PCs. Added up, this will mean more than 600,000 additional copies of *Ensemble* in circulation. More *Ensemble* users mean more incentive for publishers to develop programs for the environment.

DOS 5.0

Windows, Ensemble, and *DESQView* have one thing in common: If you look below the fancy windows and dialog boxes, you'll find DOS. These environments sit on top of DOS and use DOS services, and so in a sense, they're DOS enhancements. That's why they're called interfaces or environments rather than operating systems.

Does it matter which version of DOS you're using with your GUI? If you're running DOS programs, it matters a great deal. That's why Microsoft's release last June of DOS 5.0 (Microsoft, One Microsoft Way, Redmond, Washington 98052; 206-882-8080; $99.95) isn't just important news for command line addicts; it's significant for GUI aficionados, too.

From the first, you'll sense that this version of DOS is different. DOS 5.0 comes with the best installation program I've seen. It walks you through each step of setup and even saves information about your previous DOS configuration so you can *uninstall* 5.0 and return to your older version if you want.

You won't want to go back, though. Just a few minutes with 5.0 will convince you it's the wave of the future. Here's a rundown of what's new.

First, 5.0 has impressive memory management facilities that allow you to load DOS itself into high memory on 286 and 386 machines and load device drivers and TSRs into high memory on 386 computers. When you're running a DOS app from *Windows* or *Ensemble,* you'll have *much* more room for your programs. After installing 5.0, I have about 615K free left over in *Windows* that I can use to run my DOS programs.

Programmers will be glad to find that an interpreter-only version of *Microsoft QuickBASIC* has replaced GW-BASIC. And everyone will be glad to see EDLIN finally made obsolete by EDIT, an excellent text editor with pull-down menus and full mouse support.

DOS 5.0's DIR command is actually useful. Instead of the bleak display option served up by previous versions, this DIR comes with a ton of switches that allow you to display directory information in almost any shape or form. There's even an option that displays files in all of a directory's subdirectories. Plus, you can set these switches as an environment variable so you don't have to type them each time you issue the command.

Last, there's DOSKEY, a new command line retriever. It stores your most recently used commands in a buffer for quick recall. This kind of program is necessary for extensive command line work, and it's great that DOS finally has this type of command.

All in all, DOS 5.0 is *very* impressive. No matter which GUI you're running, 5.0 will give it more elbow room and make the time you spend at the command line more productive and enjoyable. ❐

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Address______________________________________
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Telephone (   )______________________________

1. Please send me item number ______ to preview. (Please fill in identification number of program shown above.)
2. AGE of child (check one):
   ☐ 3-7 ☐ 7-10 ☐ 10-13+
3. Computer you own and size of disk required (check one):
   ☐ IBM/Tandy & Compatibles with 5 1/4" disk drive
   ☐ IBM/Tandy & Compatibles with 3 1/2" disk drive
   ☐ Apple II Family & Compatibles with 5 1/4" disk drive
4. Child's name______________________________
   Child's birthdate: Month________ Day________ Year______
5. Please check below if you have a:
   ☐ Printer ☐ Modem ☐ Color Monitor
6. Parent's Signature______________________________

701A

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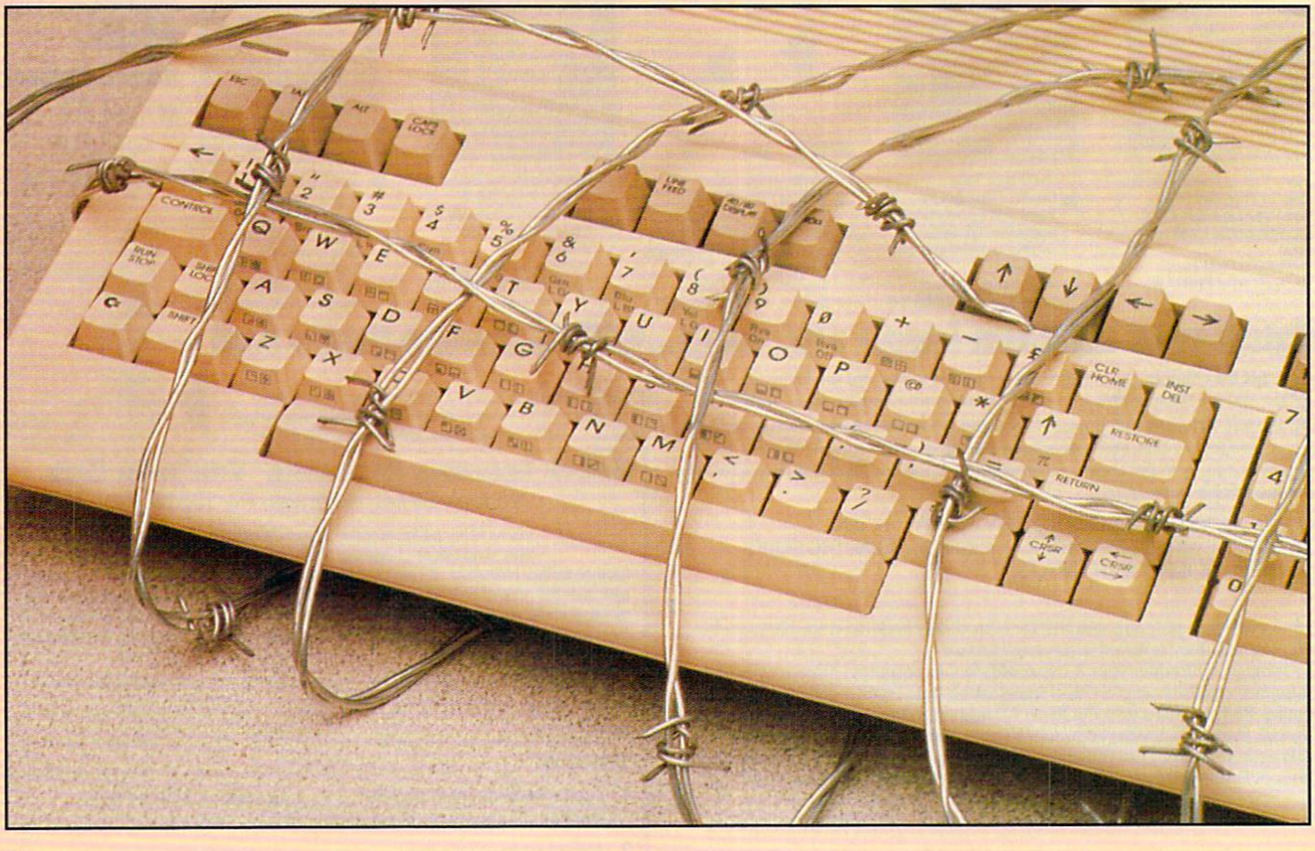

BY
CHANTELLE OLIGSCHLAEGER
AND
ERIN RICHTER

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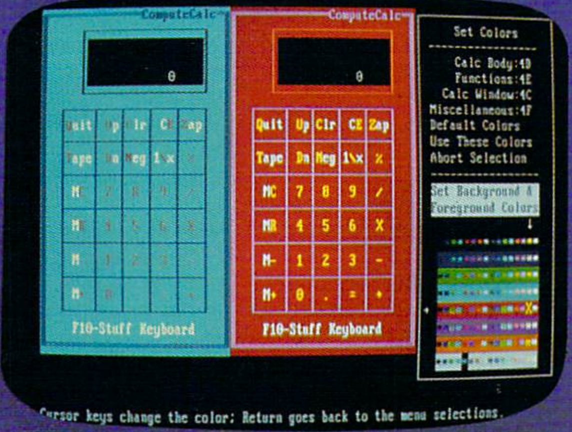
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Although your chances of encountering a computer virus are slim, protecting yourself with the right software can give you peace of mind. You may opt to use a resident program that continually monitors your system; you may want to scan new software before you install it. No matter what level of virus protection you're after, you'll find the software you need in this buyer's guide.

Anti-Virus 1.0

Requirements: DOS 3.0 or higher, 512K. *Windows* supported.
Spectrum of viruses: Protects against 400 viruses.
Defense: Memory-resident program removes 95 percent of viruses that it recognizes from infected files, boot sector, or memory. Also immunizes files, giving them their own antivirus capabilities to notify user of any changes and to "heal" themselves.
Network support: Yes.
Customer support: Central Point Software offers a 24-hour virus hotline, quarterly mailings on new virus signatures and upgrade offers, online support on BBS and CompuServe (GOCENTRAL), and a free virus-protection software update coupon.
Comments: Virus Update command allows users to enter newly discovered virus signatures into *Anti-Virus.*

CENTRAL POINT SOFTWARE
15220 NW Greenbrier Pkwy., Ste. 200
Beaverton, OR 97006
(800) 445-4208—customer service
(503) 690-8080—technical support
$129

AntiVirusPlus

Requirements: DOS 3.0 or higher, 256K.
Spectrum of viruses: Not applicable.
Defense: Memory-resident program prevents any penetration of viruses into files and disks. It does not detect individual virus signatures, but it does send a warning if there is hostile activity. *AntiVirusPlus* also monitors DOS function calls, allowing the user to run an infected program without activating the virus. It scans and removes the virus code from the infected files as it reconstructs the original data.
Network support: Yes.
Customer support: Telephone, fax, and BBS.
Comments: Site licenses available.

TECHMAR COMPUTER PRODUCTS
97-77 Queens Blvd., Ste. 812
Rego Park, NY 11374
(800) 922-0015
(718) 997-6666
$99.95 (Network prices differ.)

Certus 2.1

Requirements: DOS 3.1 or higher, floppy drive and 128K needed for installation, 3K to 10K needed when resident. Compatible with *Windows* 3.0.
Spectrum of viruses: Protects against more than 300 viruses and variants.
Defense: Memory-resident program detects, identifies, and removes viruses and variants in the computer's memory, boot tracks, and files. Can be configured to prevent infected files from running or to prevent infected files from being copied to or from a system.
Network support: Yes.
Customer support: Toll-free telephone and BBS support. Free quarterly upgrades included with purchase of maintenance program (cost depends on purchase price). Otherwise, upgrades cost $25 each.
Comments: Corporate licensing is available.

CERTUS INTERNATIONAL
13110 Shaker Sq.
Cleveland, OH 44120
(800) 722-8737
$189 (LAN version for $1,399.)

CLEAN-UP

Requirements: DOS 2.0 or higher, 256K.
Spectrum of viruses: Protects against 62 viruses as of June 20, 1991.
Defense: Stand-alone program disinfects by removing the viral code and rewriting the cleaned program.
Network support: Yes.
Customer support: Telephone.
Comments: *CLEAN-UP* is shareware.

MCAFEE ASSOCIATES
4423 Cheeney St.
Santa Clara, CA 95054-0253
(408) 988-3832
$35

Dr. Solomon's Anti-Virus Toolkit

Requirements: DOS 2.0 or higher, 512K. Supports *Windows* and OS/2 by booting from DOS.
Spectrum of viruses: Detects more than 450 viruses and variants.
Defense: Stand-alone program guards against duplicate infections, protects from outside infections, and inoculates against specific viruses. Checks all the executable files, boot sector, and hard disk partitions. Looks for the patterns that viruses create, enabling it to check for unknown viruses.
Network support: Yes.
Customer support: Telephone and fax support. Includes first year of quarterly upgrades.
Comments: Site licensing available. Software supplied on read-only disks.

ONTRACK COMPUTER SYSTEMS
6321 Bury Dr.
Eden Prairie, MN 55346
(800) 752-1333
$279.95 for one year, Virus Immunization Program available for an additional $395.00 per year.

Flu-Shot+ 1.82

Requirements: 256K. Compatible with *Windows.*
Spectrum of viruses: Protects against more than 500 viruses.
Defense: Memory-resident and standalone programs monitor system and stop operation if anything suspicious occurs. Does not disinfect.
Network support: Yes.
Customer Support: Free support is available by telephone, BBS, and CompuServe E-mail. Discounts on upgraded software are available for registered users.

SOFTWARE CONCEPTS DESIGN
594 Third Ave.
New York, NY 10016
(212) 889-6431
$19 (Includes shipping and handling.)

HardDrive Overlord!

Requirements: DOS 3.0 or higher, 275K. Compatible with *Windows* 3.0.
Spectrum of viruses: Not applicable.
Defense: Memory-resident program detects viruses on disks and hard drives by monitoring activity and notifying the user if any problems occur that could be virus related. Authenticators validate programs to ensure that they have not been damaged by a virus. They also check a program's footprint to ensure that it matches the one on file.
Network support: Yes.
Customer support: Telephone.
Comments: Site licenses available.

POP COMPUTER PRODUCTS
P.O. Box 1389
Evergreen, CO 80439
(303) 674-0200
$99.95

PC/Assure 3.5

Requirements: DOS 3.0 to 4.0, 640K. Compatible with *Windows* 3.0.
Spectrum of viruses: Not applicable.
Defense: Memory-resident program protects files from any unauthorized changes and keeps unauthorized files from running on computer.
Network support: *NetAssure* is available for each workstation; *NetServer* is available for the file server.
Customer support: Toll-free telephone.
Comments: *PC/Assure* offers security features in addition to virus protection.

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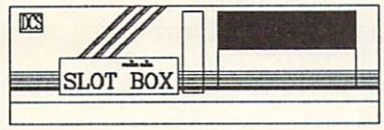

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(703) 758-7000
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PC-cillin 3.0

Requirements: DOS 2.1 or higher, 6K, one 25-pin parallel port.
Spectrum of viruses: Four-stage program detects and prevents all known and future viruses, quarantines viruses coming from external sources. Hardware Immunizer provides automatic boot-sector damage recovery. Supplies option to remove infected file but does not repair it. Hardware Immunizer contains 1Kb of nonvolatile EPROM memory.
Defense: Device driver and memory-resident program check files, file allocation tables, and the system RAM. Allows a choice of three virus detection sensitivity levels, user definable virus warning messages, and automatic online scan for boot sector viruses. Contains built-in self-check.
Network Support: Yes.
Customer support: Toll-free telephone, fax, and BBS support. Updates free for first year through BBS. At the end of first year, upgrades will cost 15 percent of the list price.
Comments: One-year warranty. Site licensing available. Fully compatible with newly developed or upgraded memory management systems, including *QEMM, 386Max,* and DR DOS 5.0.

TREND MICRO DEVICES
2421 W. 205th St., Ste. D-100
Torrance, CA 90501
(800) 228-5651
$139 (*PC Rx,* a software-only version of *PC-cillin,* is available for $69. Package includes discount coupon to upgrade with hardware.)

SENTRY

Requirements: DOS 2.0 or higher, 256K.
Spectrum of viruses: Not applicable.
Defense: Stand-alone program creates a log file of system and compares it to the computer's current state. It displays a warning if there's a discrepancy.
Network support: No.
Customer support: Telephone.
Comments: This is a shareware program.

MCAFEE ASSOCIATES
4423 Cheeney St.
Santa Clara, CA 95054-0253
(408) 988-3832
$25

Vaccine Toolkit 4.0

Requirements: DOS 2.0 or higher, 256K. Compatible with *Windows* 3.0.
Spectrum of viruses: Scans for and detects more than 400 viruses. When a virus is detected, it offers options to delete the file, leave the file as is, or provide description of the virus for reference.
Defense: Combined memory-resident and stand-alone programs check boot sector files, executable-type files, and overlays. The software utilizes a listing of virus signatures to detect the presence of known viruses and warns user of potential virus activity through creation of executable file checksum. To avoid false alarms, the software can be "taught" which programs on the system are safe.
Network support: *VacNet* is similar to *Vaccine Toolkit* but specifically designed for networks. Retail price $99.95.
Customer support: Toll-free telephone, fax, and BBS support. Updates released approximately monthly on BBS.
Comments: Site licensing and volume discounts available.

WORLDWIDE SOFTWARE
20 Exchange Pl., 27th Floor
New York, NY 10005
(212) 422-4100
$99.95

Virex-PC

Requirements: DOS 2.1 or higher, 512K. Compatible with *Windows* 3.0 and Novell networks.
Spectrum of viruses: Detects more than 70 viruses.
Defense: Memory-resident program repairs files damaged by the most common viruses. Once a system is disinfected, the program monitors it to prevent any other virus attacks. The program creates a signature for each file and notifies the user if any changes have been made.
Network support: Yes.
Customer support: Microcom offers virus upgrades on a quarterly basis. Users can subscribe for $75 or buy each update for $25. Microcom can be accessed through America Online; it also offers a free file analysis through that network.
Comments: Site-license discounts available; *Virex-PC* also detects any activities of the Trojan Horse program. *Virex* is also available for Macintosh computers.

MICROCOM
3700-B Lyckan Pkwy.
Durham, NC 27707
(919) 490-1277
$129.95

Virucide 2.2

Requirements: DOS 2.11 or higher, two floppy disk drives or a hard disk drive, any monitor or printer, 256K.
Spectrum of viruses: Detects and destroys all currently known viruses as of May 1991, a total of 490 boot, file, and stealth viruses, including those that reside in memory.
Defense: Stand-alone program scans floppy, hard disk, and network drives. Restores affected files to normal whenever possible. Provides descriptions of all known viruses. Able to run unattended. Lets users add to default extensions for scanning overlays.
Network support: Yes.
Customer support: Telephone and fax support. Includes an online reference file containing detailed descriptions of all known viruses. Includes the availability of upgrades (approximately quarterly) as new strains develop. If an upgrade is released within 60 days after purchase, the upgrade is free. After that it costs $12.
Comments: Site licensing available. Runs in less than a minute under most circumstances. Menu-driven format.

PARSONS TECHNOLOGY
375 Collins Rd. NE
Cedar Rapids, IA 52402
(800) 223-6925—direct sales
(800) 369-5000—dealer sales
$49

Virusafe 4.02

Requirements: DOS 3.0 or higher, 512K. Compatible with *Windows* and *DESQView.*
Spectrum of viruses: Recognizes over 260 known viruses, removes over 160. Updated regularly.
Defense: Memory-resident program seeks, identifies, and removes known viruses in programs. Also checks programs for virus-related changes and guards against new virus attacks.
Network support: Yes. A special feature notifies users of virus in any part of the network.
Customer support: Telephone and fax.
Comments: Site licenses are available for *Virusafe. Multisafe,* which gives the user control over who uses the computer, is also available for $180.

XTREE
4330 Sante Fe Rd.
San Luis Obispo, CA 93401
(805) 541-0604
$99

VIRUSCAN

Requirements: DOS 2.0 or higher, 256K.
Spectrum of viruses: Detects 760 viruses as of June 20, 1991.

Defense: Stand-alone program scans all drives for known viruses. It identifies and locates the virus on the system.
Network support: *NETSCAN* is the network file-server version of *VIRUSCAN.* It checks the file server only, while individual stations require *VIRUSCAN.* Its price depends upon the number of units using this program.
Customer support: Telephone.
Comments: *VIRUSCAN* is shareware.

MCAFEE ASSOCIATES
4423 Cheeney St.
Santa Clara, CA 95054-0253
(408) 988-3832
$25

Virus Checker

Requirements: IBM PC or compatible.
Spectrum of viruses: Approximately one-third of all viruses.
Defense: Stand-alone program checks disks to see if they have been infected. If it finds a virus, it will alert the user of the infection. It can only detect viruses in EXE files.
Network support: No.
Customer support: Telephone and mail.
Comments: This is a freeware program that can be backed up with *Super Virus Checker* for $25. *Super Virus Checker* uses six programs that more thoroughly detect or remove 99 percent of known viruses.

LEITHAUSER RESEARCH
4649 Van Kleeck Dr.
New Smyrna Beach, FL 32169
(904) 423-0705
Free

VirusCure Plus

Requirements: DOS 2.1 or higher, 256K.
Spectrum of viruses: Detects more than 500 viruses and removes more than 240.
Defense: Memory-resident program scans memory and prevents viruses from entering the system. If a virus is detected, the program will destroy it before it infects any files. It also repairs and restores damaged files.
Network support: Yes.
Customer support: Telephone, BBS, 24-hour Virus Helpline. Registered users may have free upgrades for two years after purchase. Afterwards, users can buy four upgrades for $30.
Comments: Site licenses available.

INTERNATIONAL MICROCOMPUTER SOFTWARE
1938 Fourth St.
San Rafael, CA 94901
(800) 833-4674
$99.95

Virus Prevention Plus

Requirements: DOS 3.1 or higher, 512K.
Spectrum of viruses: Detects more than 400 viruses.
Defense: Stand-alone program prevents unauthorized use of the PC, "fingerprints" all approved programs to tell if program has changed, prevents unapproved programs from running, prevents writing to the boot and partition sectors, detects viruses, scans new and existing programs, and removes viruses.
Network support: Yes.
Customer support: One hour of free telephone support, upgrades for six months after purchase.
Comments: This program uses McAfee Associates' *VIRUSCAN* for detection of viruses. It can also be used with McAfee's *NETSCAN.*

PC GUARDIAN
118 Alto St.
San Rafael, CA 94901
(800) 288-8126
(415) 459-0190—inside CA
$124.95 (With *VIRUSCAN,* add $25.00.)

VIRUS-PRO

Requirements: 512K.
Spectrum of viruses: Not applicable.
Defense: Stand-alone program detects any changes to installed software. It also maintains records and checks new scan files against old scan files.
Network support: Yes.
Customer support: Telephone.
Comments: *Corporate VIRUS-PRO* assigns an identifier to each PC and also has a Baseline to compare software with the corporate standard.

INTERNATIONAL SECURITY TECHNOLOGY
515 Madison Ave., Ste. 3200
New York, NY 10022
(212) 288-3101
$49.95 per copy, single-PC version. Volume discounts available. *Corporate VIRUS-PRO* costs between $5 and $15 per PC depending on the number of PCs using the program.

Virus Secure

Requirements: DOS 3.0 or higher, *Windows* 3.0, 1MB.
Spectrum of viruses: Guards against more than 300 varieties of known computer viruses as well as unknown ones, expandable to over 500 through free BBS.
Defense: Stand-alone program scans every file, selected file types, specific directories, or any combination for changes in files. Drives may be included or excluded from disk scans.
Network support: No.
Customer support: Telephone and BBS support. Updates will be available through data information networks, as well as other more traditional means.
Comments: Site licensing available.

ABACUS
5370 52nd St. SE
Grand Rapids, MI 49512
(616) 698-0330
$95

Virus Stopper 2.01

Requirements: IBM PC or compatible.
Spectrum of viruses: 99 percent of all viruses.
Defense: Memory-resident program helps prevent the spread of viruses from one disk to another. The program also prevents any damage to the system by displaying a warning to the user so that action can be taken.
Network support: No.
Customer support: Telephone and mail.
Comments: This is a shareware program.

LEITHAUSER RESEARCH
4649 Van Kleeck Dr.
New Smyrna Beach, FL 32169
(904) 423-0705
$10

Vi-Spy 6.0

Requirements: DOS 2.0 to 4.0, 128K.
Spectrum of viruses: Identifies 20 known viruses.
Defense: Memory-resident program checks for known and unknown viruses by showing a map of the system's memory and checking each area for any differences that could be viruses. It also checks disks when they are first entered into the drive.
Network support: Yes.
Customer support: Telephone. Registered users are notified of any updated information; emergency support is available using an ASCII text file.
Comments: Site licenses available. Version 7.0 will soon be available, but the price was not known at press time.

RG SOFTWARE SYSTEMS
6900 E. Camelback Rd., Ste. 630
Scottsdale, AZ 85251
(602) 423-8000
$250

VSHIELD

Requirements: IBM PC or compatible, DOS 2.0 or higher, 256K.
Spectrum of viruses: Protects against 760 viruses as of June 20, 1991.
Defense: Memory-resident program scans for known viruses and then monitors all program load requests.

VSHIELD prevents infected programs from being loaded and infecting the system.
Network support: It does support workstations, but not file servers.
Customer support: Telephone.
Comments: This is a shareware program.

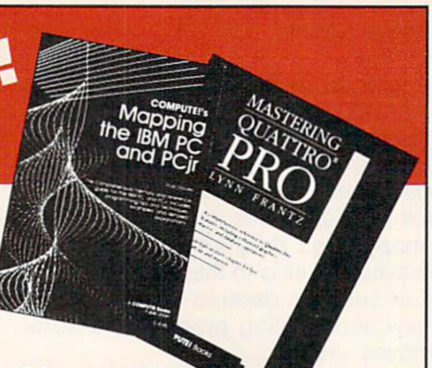
MCAFEE ASSOCIATES
4423 Cheeney St.
Santa Clara, CA 95054-0253
(408) 988-3832
$25

WATCHDOG PC Data Security

Requirements: IBM PC, PS/2, or compatibles with a hard disk drive and one floppy disk drive. DOS 2.1 or higher or IBM OS/2 1.1 Standard and 1.1 Extended required. Also compatible with *Windows* 3.0; 17K required for Basic Security; 0K to 50K required for Maximum Security depending on EMS memory available.
Spectrum of viruses: Detects, thwarts, and reports common computer viruses.
Defense: The program (device driver in CONFIG.SYS) prevents a virus from altering or destroying any DOS system file, including the files used to boot the PC from the hard disk and the files used to operate the PC. Protects disk drives, directories, program and data files, and utilities by placing them within the security environment.
Network support: Yes.
Customer support: Toll-free telephone support. One major upgrade per year with other upgrades released when necessary. Upgrades are free with membership ($35 per year) in the maintenance program. Otherwise, upgrades are $50 each.
Comments: Site licensing available. (Virus protection is one part of overall security software that features ID and password control, multiple user permission levels, automatic file encryption, and audit trails.)

FISCHER INTERNATIONAL SYSTEMS
4073 Merchantile Ave.
Naples, FL 33942
(800) 237-4510
$295 (Standard retail; ½ card option, called WATCHDOG Armor, $445.)

Chantelle Oligschlaeger and Erin Richter worked with *COMPUTE* this past summer as participants in the American Society of Magazine Editors 1991 Magazine Internship Program. Chantelle is a rising senior at the University of Missouri in Columbia. Erin was recently graduated from the University of Texas in Austin. The entire staff wishes them the best of luck. ❐



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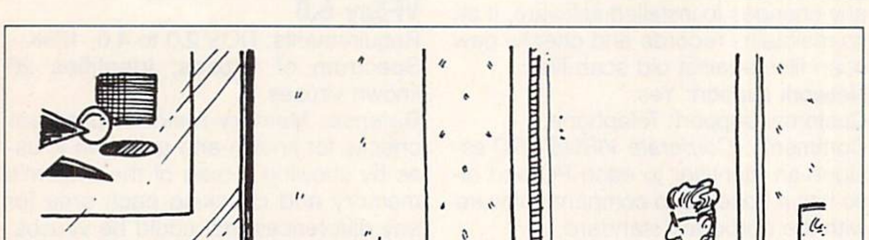

"Your computer will see you now . . ."

INTRODOS

Tony Roberts

KEYBOARD RESHUFFLE

How would you like to have your own set of DOS function keys? Using the ANSI.SYS device driver, which extends the keyboard and screen functions of DOS, you can establish your own personal set of keyboard macros.

If ANSI.SYS, which is part of the DOS package, isn't installed on your system, add the line DEVICE=ANSI.SYS to your CONFIG.SYS startup file. (If ANSI.SYS is stored in a directory other than your root directory, be sure to include the complete path so DOS can locate the file.)

ANSI.SYS allows you to redefine keys through ANSI escape sequences. The general format for an escape sequence is the combination of the Escape character (ASCII 27), the Left Bracket character ([), one or more decimal numbers or strings separated by semicolons, and a Command character.

To create an escape sequence for key redefinition, load the word processor or text editor you use to modify your AUTOEXEC.BAT and CONFIG.SYS files. Make certain your editor can save unformatted ASCII files or text files.

These commands can't be entered directly from DOS because the commands must contain the Escape character. As you may know, pressing the Esc key in DOS clears the command line—not the effect we're trying to achieve.

Enter the lines below, substituting the Escape character for the letters *ESC* at the beginning of each line. (In many word processors, you can simply press the Esc key to generate the Escape character.)

```
ESC[0;67;"DIR A:"P
ESC[0;68;"DIR A:"13P
```

The numbers 0;67 and 0;68 are the extended character codes for the F9 and F10 keys respectively. The first of the two lines above assigns the string DIR A: to the F9 key. The second line adds a carriage return (ASCII 13) to the same command and assigns the string to F10.

Save the file under the name KEYS.ANS; then go to DOS and execute the command TYPE KEYS.ANS to install the new key definitions. Press the F9 and F10 keys to see how the two versions of the command behave.

Using this procedure, you can assign strings to function keys to run favorite programs with a single keystroke or to simplify data entry chores.

For example, if you're entering name and address information into a label program and you're working on a local list where nearly everyone lives in your hometown, you can save time by putting the string HOMETOWN, STATE ZIP on a function key.

Here in Greensboro, North Carolina, we have several ZIP codes, but they all begin with 274. I define my function keys to include GREENSBORO, NC 274. I simply press the assigned key, enter the last two digits of the ZIP code, and quickly move to the next record.

There are a few things to keep in mind when using ANSI key redefinitions. First, you can't redefine too many keys. The ANSI.SYS driver only allows about 200 characters of redefinitions.

Second, many programs redefine the function keys for their own purposes. When you use those programs, your key definitions will be suspended until you return to DOS.

Third, DOS itself uses a few of the function keys. You're free to redefine them, but you'll overwrite the DOS defaults. DOS uses keys F1–F6 as command line editing keys.

Lastly, the keys are redefined using your environment space. Make sure you have enough allocated in your CONFIG.SYS file. Here's a line from a CONFIG.SYS file that gives the environment 512 bytes.

```
SHELL=COMMAND.COM /P/E:512
```

Redefined keys stay in force until you change them or reboot. If you develop a set of redefinitions that you use regularly, you may want to place them in your AUTOEXEC.BAT file, so they take effect each time you boot up.

To do this, either have your AUTOEXEC.BAT execute the command TYPE *keyfile,* where *keyfile* is the name of the file that stores your redefinitions, or add the ECHO command to each of your key redefinitions and include the redefinitions right in the AUTOEXEC.BAT file.

Create your own set of keyboard macros with a DOS program that you already have.

For example, ECHO ESC[0;66;"CHKDSK";13P reprograms the F8 key to run the CHKDSK program on the default disk.

If you're ready to begin setting up your own personal macros, you'll need the extended character codes for the function keys. They are 0;59–0;68 for F1–F10, 0;84–0;93 for Shift-F1–Shift-F10, 0;94–0;103 for Ctrl-F1–Ctrl-F10, and 0;104–0;113 for Alt-F1–Alt-F10.

The 0 that precedes each of these code numbers tells ANSI.SYS that the following value is an extended character code. If you leave off the 0, ANSI.SYS treats the number you supply as an ASCII value.

You could, if you wanted, redefine the lowercase *a* (ASCII 97) to be an uppercase *A* (ASCII 65) with the command ESC[97;65P. To return a changed key back to normal, assign it to itself as in ESC[97;97P. ❐

PROGRAMMING POWER

Tom Campbell

ASSEMBLY MEANS SPEED

This issue's program is a good example of both the benefits and the perils of programming in assembly. It's tiny, but its 100 lines would only require 10 or 12 lines in a higher-level language.

FMFD.COM is a utility that does nothing more than send a form feed to the specified printer. Some text editors and other text-processing tools (such as DOS's COPY command with LPT as the destination) don't offer the courtesy of forcing a page break when a partial page of text is printed. While it's true that you can reach over and push the form feed button on your printer, you may need to perform this operation from a batch file.

When speed is essential, assembly language is your ticket for a ride on the lightning bolt express.

The syntax of FMFD is FMFD *port,* where *port* is an optional parallel port number from 1 to 4. If you omit the number, port 1 is assumed. Here are some examples: FMFD, FMFD 1, FMFD 3. The first two examples send a page break to LPT1. The third example sends it to LPT3. If you use a serial port for your printer, you're out of luck.

The first section of FMFD.ASM consists of equates. Like the #define in C, they serve as a single-object text-replacement facility. Assemblers make a secret first pass at your code so they can collect equates and macros (we'll get to macros shortly); then they expand them into a temporary file, which is actually the file that gets assembled. In *MASM* and *TASM,* the /L option creates a file with an LST extension exposing the inner workings of macros and equates. The line FormFeed EQU 12 means that we can later use FormFeed instead of a literal form feed character (which would corrupt the source file) or the number 12 and that the assembler will replace it with 12 internally. You can also use the equal sign for equates.

The PrintMsg macro looks like a subroutine, but it isn't. Macros, like equates, work via text replacement, but they allow parameters and aren't restricted to a single line. So instead of *PrintMsg BadChar,* the assembler will see, on its second pass, this code:

```
mov dx, es
mov ds, dx
mov dx, offset BadChar
mov ah, 9
int 21h
```

The .Model directive, pioneered by Microsoft in *MASM* 5, is new to assemblers. Its purpose is to make multilanguage programming easier by automatically supplying different default values for procedure calls and data (near versus far in both cases).

No doubt Microsoft's own programmers got tired of writing similar but not identical runtime libraries for all their languages. Ironically, the Tiny model won't work with *MASM* 5.1, but it will work with 6.0 and *QuickAssembler,* the one you're more likely to own. Many of *QuickAssembler's* features couldn't be found in 5.1 but were debuting in 6.0. Tiny will work fine with Borland's *Turbo Assembler.*

The .Code directive means executable code will follow. You can alternate several .Code, .Data, and .Stack directives in each file, but few do. It's considered good form to collect each element into one location. The .Code directive stands in for the more archaic _TEXT SEGMENT WORD PUBLIC 'CODE'.

It's said that .Code is a simplified segment directive because of this, and that's absolutely true. The old way was more flexible but is virtually never needed now, except perhaps for writing device drivers. The old segment directives are barbaric and unreadable, and you should be ashamed to use them.

ORG 100h forces execution to start at address 100 hex, or 256 decimal. All COM files do this. While Microsoft tried to prohibit the practice some years ago, even to the point of dropping COM support from every single one of its language products, popular sentiment was overwhelmingly for COM files. The EXE format lets DOS move the program anywhere it needs to (EXE files, in fact, are not completely linked until just before execution starts), but COM files are always at least 512 bytes smaller. This matters if you're using a laptop or a RAM disk. Plus, there's a vast body of source code for COM files free for the asking.

At this point, not a single line of executable code has appeared. That will change. About half of FMFD's 102 bytes are used in parsing the text of the command line, which is located at offset 81h in the PSP. The PSP, or Program Segment Prefix, is a data structure that DOS loads right before your program and which contains lots of useful values. It so happens that in a COM file the segment registers all point to the PSP, so all we have to do to point DS:SI at the command line is write the value 81h to SI.

The LODSB instruction is a nifty little dude that does several things at once. It copies the byte pointed to by DS:SI into AL; then it increments SI to point to the next byte. (The STD instruction can be used to bump SI backward instead.) The command line is terminated by a carriage return (ASCII 13—see the equates), so we simply loop until a nonblank character or CR is encountered. Lines like this aren't all that hard to comprehend.

cmp al, CR ; Reached end yet?
je @@Finished ; Yes.

The value contained in AL is compared to 13. If they're equal, control passes (via jump if equal) to the code labeled *@@Finished.* Note that *Turbo Assembler* treats any labels starting with two @ signs as local to that procedure, so you can reuse generic labels like *@@TryNext* or *@@Exit* as often as you want.

CX was set to 0 before starting and is set to 1 if a valid digit is found. If not, CX is still 0, and the default value of 1 is inserted. INT 17h, subfunction 0 writes a byte to the specified printer port whose number is written to DX. Port 1 is 0, Port 2 is 1, and so on. The instruction SUB AL, '1' normalizes the ASCII digit by subtracting the value 49 from whatever's in AL, leaving the correct binary value.

While I would normally suggest that you use DOS to open the printer as a file and write to it, using INT 17h has the welcome side effect of omitting nasty messages such as *Abort, Retry, Fail?* if the printer device isn't connected properly or is otherwise engaged. It just waits awhile and then quits. There are times when having only a hundred lines is a virtue!

Finally, instead of the usual RET instruction, the more formal technique of exiting with DOS function 21h, subfunction 4Ch is employed. A RET works in COM files but not EXE files, so I avoid it. While it would save a couple of bytes, FMFD.COM still won't occupy even the smallest possible disk sector. After all, this isn't C or Pascal. We can afford the extra two bytes. ❐

```
; FMFD.ASM -- Complete program to send a form feed to any printer
;
; To assemble using Turbo Assembler:
;
;   TASM FMFD
;   TLINK /T FMFD
;

; Equates -- these are text replacements, similar to #defines in C.

CR              EQU 13            ; ASCII carriage return.
FormFeed        EQU 12            ; ASCII form feed character.
LF              EQU 10            ; ASCII linefeed.
Tab             EQU 9             ; ASCII tab.

PrintMsg        macro Message            ; A macro, like an equate, is a
                mov dx, es               ; text-replacement facility.
                mov ds, dx               ; This loads the correct data
                mov dx, offset Message   ; segment and uses DOS function
                mov ah, 9                ; 9 to print a '$'-terminated
                int 21h                  ; message.
                endm

; The Tiny model allows you to create .COM files.  It's identical to
; Small model except that 1) Small requires a .Stack directive, and
; 2) Tiny employs the ORG 100h to start execution at address 256 decimal,
; not changeable as in an .EXE file.

                .Model Tiny

; The .Code directive indicates that the code segment starts. It lasts
; until the next .Data or .Stack directive.  The code segment is where
; executable instructions go.

                .Code

; .COM files start at a fixed location--256 bytes above the PSP, which
; contains information used by many programs.  The starting address of an
; .EXE file is not known until runtime.  ORG sets the program counter to
; 100 hex, or 256 decimal.

                ORG 100h


Begin:                              ; Leave this in as boilerplate.

                Main proc           ; A PROC is exactly analogous to
                                    ; a PROCEDURE in Pascal or BASIC.

                mov si, 81h         ; Start at cmd line. Add 1 to
                                    ; skip the length byte.
                mov cx, 0           ; 0 until a digit is found.
GetNextChar:
                ; LODSB fetches the next char pointed to by DS:SI into
                ; AL and then increments SI.
                lodsb               ; Copy next char into AL.
                cmp al, CR          ; Reached end yet?
                je @@Finished       ; Yes.
                cmp al, ' '         ; Blank?
                je GetNextChar      ; Yes. Keep parsing.
                cmp al, Tab         ; Blank?
                je GetNextChar      ; Yes.
                cmp al, '1'         ; Nonblank char. Is
                jl @@BadChar        ; it in range '1'-'4'?
                cmp al, '4'         ; LPT4 is the farthest
                jg @@BadChar        ; I've ever seen.
                mov cx, 1           ; Flag that a digit was found.

@@Finished:
                cmp cx, 0           ; Was a digit found?
                jne @@Convert       ; Yes. Do nothing.
                mov ax, '1'         ; No. Default to LPT1.
@@Convert:
                sub al, '1'         ; Convert to binary and subtract 1.
                cbw                 ; Convert AL to a word in AX.
                mov dx, ax          ; Copy to DX for int 17h call.
                mov ah, 0           ; BIOS int 17h function 0: Write char
                mov al, FormFeed    ; to printer. Char is in AL.
                int 17h             ; Send char to printer.

@@DOSExit:      mov al, 0           ; Set ERRORLEVEL to 0.
                mov ah,4Ch          ; Return to DOS using
                int 21h             ; the preferred function call.
                endp

@@BadChar:
                PrintMsg BadChar    ; Load the message's offset address,
                jmp short @@DOSExit ; display it to stdout, and quit.

; The .Data directive is where program text and other data values
; appear.  The "db" directive means that everything that follows will
; be written unchanged to the data segment.  Messages like the one
; below can use either single or double quotes as delimiters. The values
; CR and LF were defined above, and their literal values will be written
; in as ASCII codes.  Don't forget the '$' sign, because DOS function 9
; needs it to end any message it prints.

                .Data
BadChar         db 'Invalid character. Must be 1-4.',CR,LF,'$'
END   Begin
```

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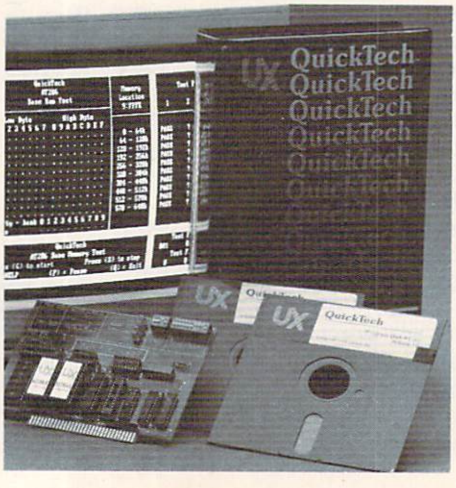

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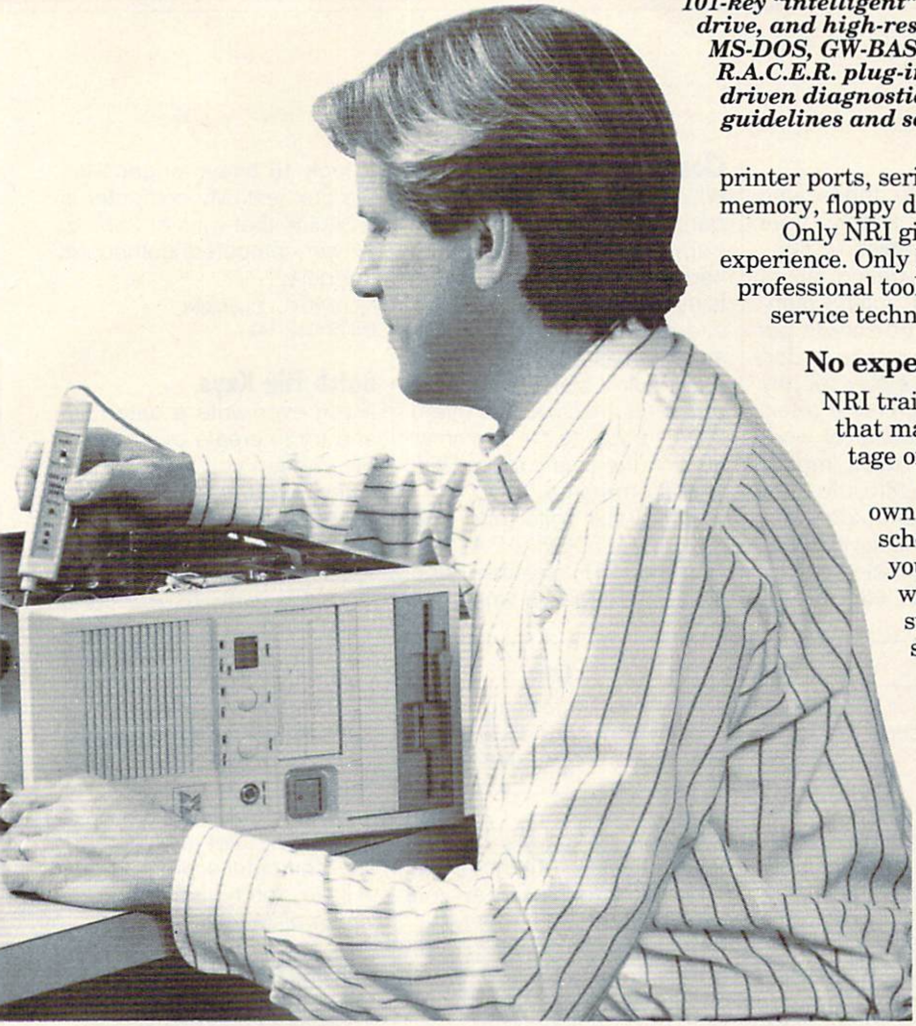

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TIPS & TOOLS

Keep track of floppies, speed up DOS, capture keypresses in batch files, conserve your handles, and operate QuickBASIC rodent-free.

Filed Floppies

Here's a tip for those who have so many floppy disks they can't find anything fast.

Begin by labeling all of your disks and putting numbers on them. Be sure to put the disks in a box in order, where you can easily see the numbers. Then, create a text file with a text editor or word processor in ASCII mode. Make a chart with the disk number, filename, description, and other useful information. Make sure that you don't use any capital letters (or if you do, make sure that you enter the search string exactly as it appears in the text file). I've written a sample that I named LIST.TXT.

#	Name	Description	Type
1	pkzip.exe	archiving utility	program
2	chapter 1.doc	the first chapter of my book	text document
3	cheeta.gif	gif picture of a cheetah	gif picture

Next, create a batch file as follows (I call it F.BAT, but you can call it anything you want). Make sure the batch file and the DOS FIND program are both in your path or in the current directory. The F.BAT file will only have one line and look like this.

```
FIND "%1" LIST.TXT
```

You can name your text file anything you want. Just make sure you change the string LIST.TXT to match whatever your filename will be.

To find a program, type *F chapter1.doc,* and you'll see the line on which the entry appears. It makes finding floppies easy, and you don't have to run a database program to do it. As long as the batch file and FIND are in the path, you can do a search from any directory.

ROY RAZON
MEITAR, ISRAEL

Closer Paths

When programs are in your path, it's easy to run them from any directory on your hard drive. But if your path is fairly long and each included directory has a lot of files, you might have a long wait for DOS to find the program. For programs that you run often, there's a way to cut to a small fraction the time it takes DOS to find programs.

Run a text editor and load in your AUTOEXEC.BAT file. Find the PATH statement and notice the order in which the specified directories appear. DOS will search them in that order to find files that you type from the command line. Directories that contain programs that are used often should be first. That way, DOS will find them right away instead of searching most of the other directories first.

How much time can you save? I wrote a COM program that was three bytes long to reduce the loading time. I then disabled my cache program so I could accurately time disk operations. Next, a batch file was created that ran the small program 50 times (making sure ECHO was off so that screen I/O wasn't a factor, either.)

For the first test I placed the small program in my DOS directory, made the DOS directory the first one in my PATH statement, and rebooted. The batch file ran in about four seconds. I then made the DOS directory the very last entry in my PATH statement and rebooted. The elapsed time for the batch file execution was one minute and four seconds. It took 16 times longer than the first test. My computer is a 386DX that runs at 25MHz. Slower computers compound the delay.

RICHARD C. LEINECKER
REIDSVILLE, NC

Batch File Keys

If you ever write a batch file and try to create even a simple menu, you'll be stuck, since you can't get a keypress from the user and then jump to the appropriate section in the batch file. Here's a way to create a COM file that will wait for a keypress and return it to your batch file as an ERRORLEVEL. The code that is returned is the ASCII code for the key that is pressed.

Make sure that the DOS program called DEBUG is in your path. Enter the following. The computer's prompts are in italic; you type the characters in plain text.

```
C>DEBUG GETKEY.COM
File not found
-E 100 2A E4 CD 16 B4 4C
  CD 21
-RCX
CX 0000
:8
-W
writing 0008 bytes
-Q
```

This creates a program file called GETKEY.COM.

The following program returns all alpha characters in capitalized form.

```
C>DEBUG ALLCAPS.COM
File not found
-E 100 2A E4 CD 16 3C 61
  72 06 3C 7A 77
  02 24 DF B4
-E 110 CD 21
-RCX
CX 0000
:8
-W
writing 0011 bytes
-Q
```

Here's a sample batch file that uses the GETKEY.COM program.

```
ECHO OFF
:BEGIN
CLS
ECHO 1.Run QuickBASIC
ECHO 2.Run XyWrite
ECHO 3.Run Windows
ECHO 4.Quit Batch File
:GETTHEKEY
GETKEY
IF ERRORLEVEL 52 GOTO END
IF ERRORLEVEL 51 GOTO
   WINDOWS
IF ERRORLEVEL 50 GOTO
   XYWRITE
IF ERRORLEVEL 49 GOTO
   BASIC
GOTO GETTHEKEY
:BASIC
QB45
GOTO BEGIN
:XYWRITE
EDITOR
GOTO BEGIN
:WINDOWS
WIN
GOTO BEGIN
:END
CLS
```

RICHARD C. LEINECKER
REIDSVILLE, NC

WordPerfect Paging

In many programs, pressing PageUp or PageDown will move to the previous or next screen of data. In *WordPerfect* pressing those keys will literally move you to the previous or next page. This is especially frustrating when you want to go to the latter part of a page but don't want to scroll through the page line by line. I have found that pressing – or + on the numeric keypad with NumLock off will allow you to move through data screen by screen with the – key moving you to the previous screen and the + key moving you to the next screen.

JIMMY QUACH
PACIFICA, CA

More Efficient Paths

The search path I use is rather long, and it eats up a lot of environment space. Here's the PATH statement.

```
PATH=C:\BATCH;C:\UTILITY;
   C:\DOS;C:\NORTON;
   C:\WORDSTAR;C:\DBASE;
   C:\GRAMMATIK;C:\
```

I save a considerable number of bytes by using the DOS SUBST command in my AUTOEXEC.BAT file. Here's what I've done.

```
\DOS\SUBST F: C:\BATCH
\DOS\SUBST G: C:\UTILITY
\DOS\SUBST H: C:\DOS
\DOS\SUBST I: C:\NORTON
\DOS\SUBST J: C:\WORDSTAR
\DOS\SUBST K: C:\DBASE
\DOS\SUBST L: C:\GRAMATIK
```

Next, I define my path. D: is my secondary partition and I define E: as a virtual disk.

Add a line to your CONFIG.SYS file like this:

```
LASTDRIVE=x
```

where *x* is the last valid virtual drive to be recognized by DOS (in my case, L:).

ROBERT R. DWELLEY
ROCHESTER, NY

Tips for Tips

The PC Hot Tip in the January 1991 issue of *COMPUTE* to swap the contents of two files can be improved upon. Here's the example from the January issue.

```
ECHO OFF
CTTY NUL
COPY %1 TEMP.DOC
COPY %2 %1
COPY TEMP.DOC %1
DEL TEMP.DOC
CTTY CON
```

For some reason DOS uses two file handles to perform a CTTY NUL, yet it only frees one for a CTTY CON. If the batch file above is run very many times, you could wind up with a Too Many Files Open error. Here's my solution to this rather vexing problem.

```
ECHO OFF
COPY %1 TMP.DOC>NUL
COPY %2 %1>NUL
COPY TEMP.DOC %1>NUL
DEL TEMP.DOC
```

BRIAN WREN
SEATTLE, WA

Mouseless *QuickBASIC*

Help screens. In *QuickBASIC* I discovered by accident that pressing the first letter of any hypertext link jumps the cursor to that topic. If several topics share a first letter, the cursor will cycle among them until you press Enter. And when looking at a QuickHelp or Details screen, Q and D toggle between those links.

Zoom. You can zoom any window using Ctrl-F10, which I often find more comfortable than clicking the zoom icon.

Opening files. Make short shrift of the Open dialog with Tab and the space bar. Press Tab to move to the file list and press the space bar to select a file. The space bar often works where Enter does in the *QuickBASIC* and *Windows* environments, especially for clicking push buttons.

TOM CAMPBELL
IRVINE, CA

If you have an interesting tip that you think would help other PC users, send it along with your name, address, and Social Security number to COMPUTE's Tips & Tools, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408. For each tip we publish, we'll pay you $25–$50 and send you a COMPUTE's PC clock radio while supplies last. ❒

Mark Minasi

TAKING A HARD DRIVE THROUGH ALPHABET SOUP

You've decided to buy a new hard drive. Which kind should you choose—ESDI, SCSI, or IDE?

Growing out of your 40-megabyte hard drive? You're in good company—plenty of us are looking to upgrade. Up above 80MB, however, there's more to worry about than how big it is.

Computer sellers refer to ESDI, SCSI, and IDE drive types. Some experts even debate the merits, fighting tooth and nail about which is better—ESDI versus SCSI. Here's what all the fuss is about and how to choose the hard drive that's right for you.

First things first: ESDI, SCSI, and IDE are all drive interfaces. No, wait—don't turn the page yet! Give me a minute. To understand what a drive interface is, consider this: You've got a hard drive, and it's attached (inside your computer, of course) to a circuit board called a hard disk controller.

How do they talk to each other? The hard drive and controller must agree on a language—how fast they should communicate with each other, what kind of commands they can pass back and forth, what level of voltage they should use to send information, and other odds and ends. Together, that's what defines the drive interface.

Old Reliable

Currently, you've probably got a drive and controller whose interface is the most common and basic one, called ST506. Having a nice reliable standard like ST506 has served the industry well for the past few years. Because all the hardware vendors understand ST506, you can buy a hard disk from vendor X, connect it to a hard disk controller from vendor Y, and be 99-percent sure they'll work together the first time.

The ST506 interface is good because it's standard, but it's bad because it has limitations that are beginning to chafe. ST506 both limits the disk's data transfer speed and requires too much of the CPU's attention, rendering it less suitable for multitasking environments such as *Windows*.

ST506's maximum data transfer rate of 750,000 bytes per second (750 KBps) must have seemed plenty of room to its designers in the late 1970s.

Even now, most XTs read data from their disks at a maximum speed of 167 KBps, and most AT clones clock in at 250 KBps to 510 KBps. But there are drives available today that could zap out data at 2500 KBps, if their interfaces could handle it.

I know you're thinking, "Only power users need that kind of speed—I don't, not for the things I do." Well, consider this—your computer becomes hundreds of times slower every time it reads or writes to the hard disk. Even the slowest XT has to wait around for its hard disk.

A 16-MHz 386SX's microprocessor could, in theory, benefit from a hard disk that transfers data at a speed of up to 8000 KBps. You'd see an immediate benefit from a faster hard disk interface even if you're already running flat-out at 510 KBps; essentially, it would balance your system's power better.

Adding Some ESDI Smarts

ESDI (Enhanced Small Device Interface) was designed basically as an improved ST506. It's designed to handle a maximum transfer rate of 3000 KBps. It does this partly by moving some of the electronics from the controller to the drive; it costs a bit more but makes for greater speeds than are possible with an ST506.

The other big difference between ST506 and ESDI is in the basic intelligence in the interface. Under ST506, the microprocessor can't tell the hard disk controller to go to location X on the hard disk and start reading the data that's there.

Instead, the CPU must do most of the work, telling the drive (through the controller) exactly how to move the disk's read head to the location of the data: "Move the disk head a little more . . . now just a little more . . . now just a bit more . . ."

With ESDI, on the other hand, the CPU just says, "Go to location X and read the data there," and then the CPU waits for the controller to do it. It's the difference between being able to tell someone "Go to the living room" and having to say "Take one step forward, then another, and another, and another, then turn left, then . . ." You see ESDI on larger (300MB+) drives.

IDE: A Poor Man's ESDI

It's reasonable to ask, "Why didn't they put some of these nifty ESDI features on ST506 in the first place and save us a lot of trouble?" Mainly because those ESDI features would have cost an arm and a leg back in the late 1970s. But nowadays they're much more affordable. That's why most drive vendors are now offering a low-cost alternative to ST506 drives called IDE—Imbedded Drive Electronics (or Intelligent Drive Electronics, depending on whom you ask).

Like ESDI, IDE puts most of the controller electronics on the drive itself. The data

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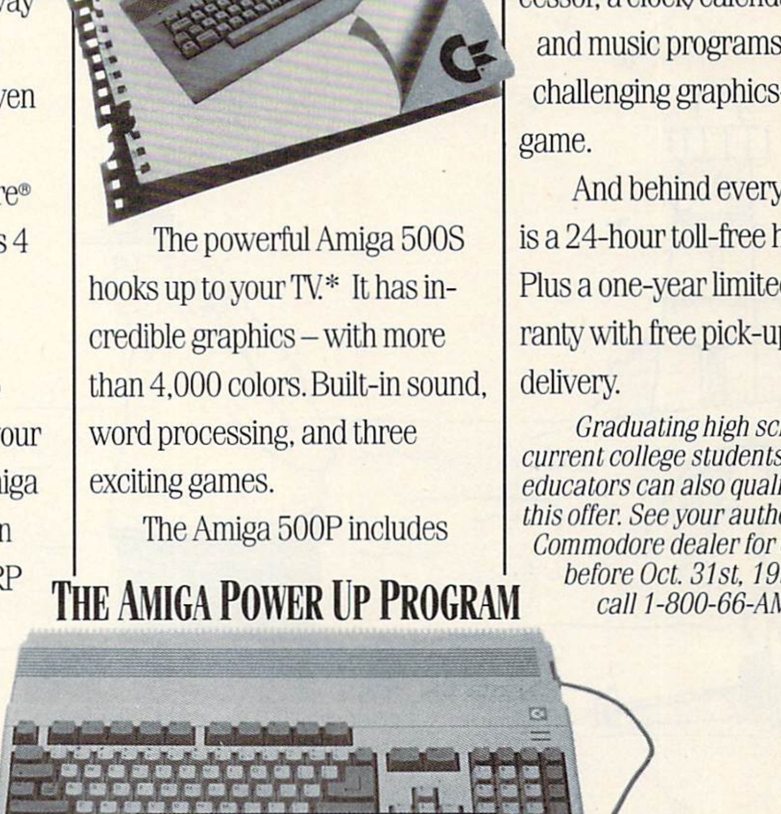

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is then pumped directly to the CPU at up to 1000 KBps—not as good as ESDI, but better than ST506.

Putting the controller and drive physically together makes IDEs easier to build, which is why IDEs are faster, cheaper, physically smaller, less power-hungry, and more reliable than corresponding ST506s.

There is, of course, one hitch. Many data recovery techniques that are available on ST506 systems can't be used on IDEs. In the words of the chief engineer of a major drive maker, IDEs are disposable. They're great drives, but if anything goes wrong, you throw them—and your data—away. I avoid them at the moment and would recommend that you do the same, but IDE manufacturers claim that they're working on models that are more fixable. When that happens, IDE will hound ST506 out of existence in short order.

SCSI Raises the Ante

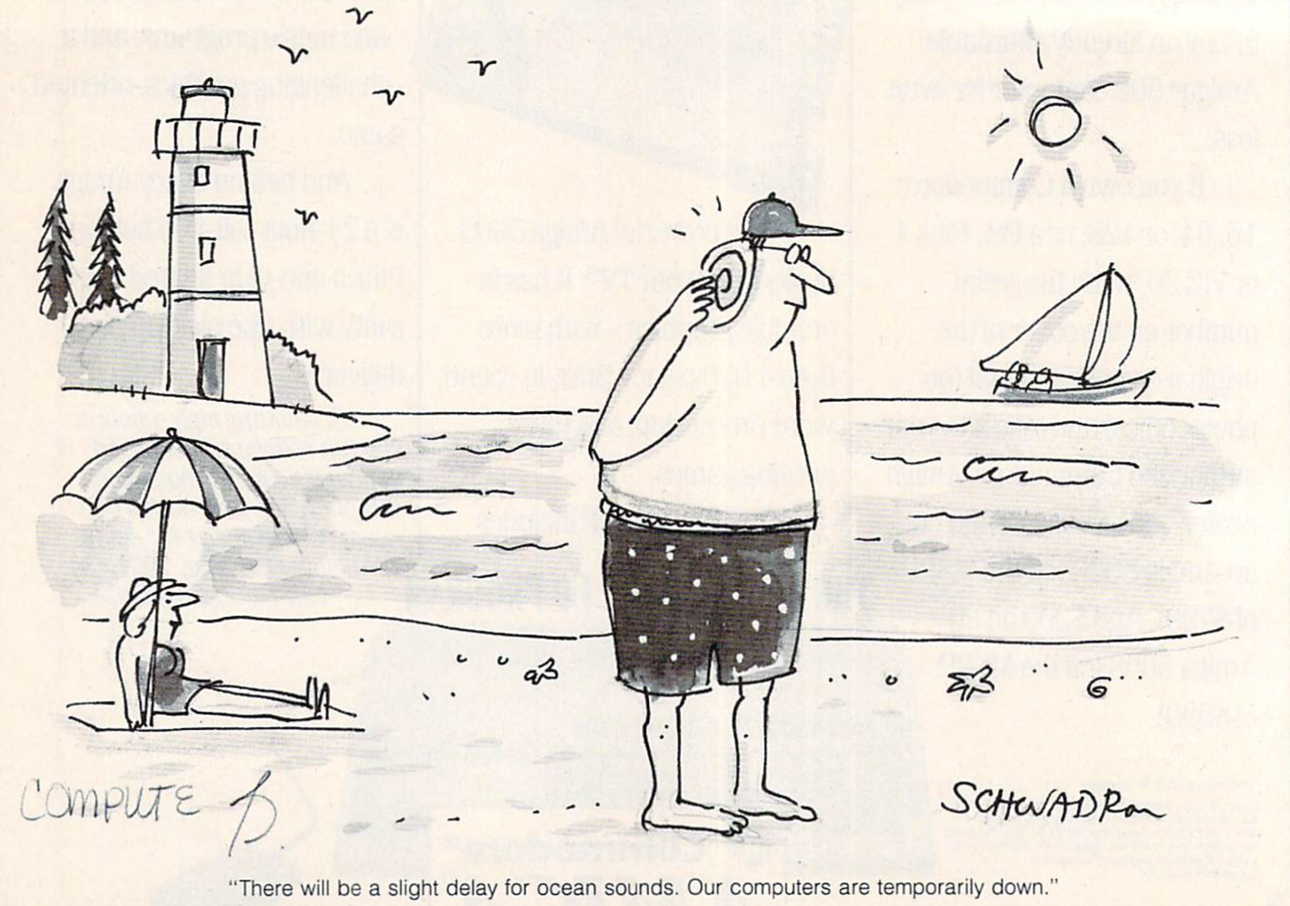
While some designers were seeking greater speed (the main goal, recall, of ESDI), others were looking ahead to more sophisticated operating systems. They sought to design an interface that could serve more than just hard disks. This new interface could be used for tape drives, floppies, and optical drives of various kinds, to name but a few.

So computer manufacturers have developed another peripheral interface called Small Computer Systems Interface (which is abbreviated *SCSI* and pronounced *scuzzy*—an unfortunate acronym, if there ever was one).

Why have SCSI in addition to ESDI? It's simple: SCSI doesn't do what ESDI does. SCSI is a bus manager, not a drive manager. It lets you put up to eight different drives—optical, floppy, whatever—on a single SCSI host adapter (you don't call them controllers, for reasons that will be clear later in this article).

That assumes, of course, that all of these drives are equipped with a SCSI interface, and it also assumes that SCSI is a solid standard. It actually isn't yet, so in reality your SCSI floppy, hard disk, and tape drives probably couldn't run off the same SCSI host adapter. Things are getting better, however, so in a year or two this scenario will be more likely to come true.

Suppose, then, that you wanted to back up your hard disk to tape and you had both a hard disk and tape that ran off the same SCSI interface. Under the normal ST506, IDE, or ESDI arrangement, the microprocessor would have to do a fair amount of work. It would have to issue commands to first read the data from the



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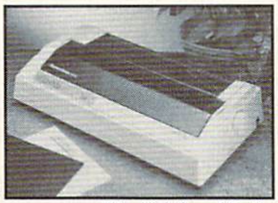

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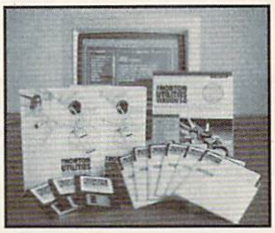

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hard disk, then copy it to the tape drive, read some more, and so on.

A Different Story

With a SCSI interface, however, the story's different. The CPU just says, "SCSI bus, get data X, Y, and Z from the hard disk, and copy that data over to the tape drive. Let me know when you're done."

And in the meantime, the CPU can be busy paying attention to something else, like running another program in some multitasking environment.

Under normal DOS, of course, the microprocessor will just twiddle its thumbs until the SCSI bus reports success, since DOS is a single-tasking, do-only-one-thing-at-a-time operating system.

The way that the SCSI interface can support so many kinds of storage devices lies in its manner of addressing these devices.

As far as it's concerned, your hard disk isn't a hard disk—it's just a storage peripheral with storage areas called sectors numbered from 0 to some large value. The same is true for floppies, tapes, or optical devices.

Which leads to an interesting question. The hard disk doesn't see itself as a mere collection of sectors—it uses a more complex addressing terminology. So who does the translation from SCSI sector addresses to physical hard disk addresses?

The answer is that every SCSI drive has a controller built right onto it, kind of like IDE. That controller talks both to the drive in whatever language the drive prefers and then to the SCSI adapter in SCSI language.

So here's the punch line: SCSI drives are really drive-and-controller combinations, and those drive-and-controller combinations can use any interface—IDE, ST506, or ESDI, although ESDI is the only one I've seen used. ESDI is used most often because of the raw speed that it offers.

No Guarantees

You can see now that SCSI, in and of itself, is no guarantee of a fast drive, although most drives chosen for SCSI are, in fact, fairly quick. SCSI really has nothing to do with speed, but rather with multitasking.

Remember that ESDI is basically just a souped-up version of ST506. Drive management is handled mainly by the CPU, and that's not a problem for single-user systems.

But what about a local area network server that must manage six or seven ESDI drives and multiple requests from different workstations for data on those drives? Because that's a lot of work for the CPU, it could benefit from distributed intelligence. SCSI provides that distributed intelligence.

In fact, the SCSI host adapter is a CPU all in itself. All the PC's microprocessor would have to do in the six-drive scenario is just to issue six data requests rapid-fire to the SCSI host adapter and then sit back and wait for the data to come in. (Actually, it wouldn't sit back and wait—a good multitasking system would do something else while waiting for the responses to come in.)

In general, you can count on an ST506 interface to transfer data at the rate of 250K–750K per second (using MFM or RLL encoding), an IDE interface to transfer data at the rate of 1MB per second (using ARLL encoding), an ESDI interface to transfer data at the rate of 1MB–3MB per second (using RLL encoding), and a SCSI interface to transfer data at the rate of 1MB–3MB per second (using RLL encoding).

So what's my advice on which kind of drive you should buy today? If you're buying a large drive for personal use, go with an ESDI drive. For a LAN server or a machine that may become a LAN server, buy SCSI for a slightly more efficient drive. ❒

ONLINE

Denny Atkin

REACH OUT AND PLAY WITH SOMEONE

You sigh with frustration. "Honey, Stephanie is still tying up the phone. Won't she ever tell her friends good-bye and come down and visit the rest of the family?"

"You're right. She should hang up and come down here and watch *Married with Children* with the rest of us. It's important that she spend time doing wholesome, family things like this," your wife responds. "Stephanie Ann! Get off the phone and get down here right now!"

"But moth-er!" she cries. "Only a few more minutes! Dave and I have three orcs cornered, and we're only two dungeon levels away from finding the Great Ark!"

"She's playing *Dungeon Monger* again with that boy from North Dakota. Why can't she just talk to her local friends like I did when I was a teenager?"

That's right, folks. A new excuse for your teenagers to tie up the phone—online games. The biggest inconvenience might not be the important business calls you miss, but the fact that while *they're* tying up the phone line and the computer, *you* can't get online and play the games yourself!

Online gaming has really taken off in the past couple of years. In the early eighties, online gamers on networks such as CompuServe and the Source could play versions of the original mainframe games, including such venerable titles as *Colossal Cave Adventure* and *Star Trek*. While these games were fun, they were generally single-player games, and the only real advantage in playing them online, rather than playing a version on your personal computer, was that the games were larger in scope than the common 64K machines could handle.

As personal computers became more powerful and the IBM PC replaced CP/M computers and C64s as the de facto BBS platform, online games grew in sophistication. Instead of calling up a national network to play *Adventure* all by yourself, you could just dial your local BBS and challenge a number of other players to games like *TradeWars,* a multiplayer space game. Most of these boards still only supported one user at a time, so players would have to take turns making their moves. Still, it was much nicer to have a human opponent.

The late 1980s saw an online gaming renaissance. The biggest networks, CompuServe and GEnie, began to expand their online gaming areas. As the old single-player adventure games dropped in popularity, the networks began to implement multiplayer games that took advantage of the unique features of online services. You could log on and explore dungeons or destroy space armadas with people from around the country. And unlike most of the BBS games, you could interact with several different players at the same time.

The games became more sophisticated. The text-based games grew—GEnie's *Gemstone III* adventure game is larger in scope and more complex than any of the disk-based text adventures. Perhaps the biggest groundbreaker was *Air Warrior,* a multiplayer World War II air combat game. No longer were online games trapped in the realm of text-based interfaces.

Even when you're not online, *Air Warrior* is a superb flight simulator, with speedy polygon graphics and a realistic flight model. But when you log on, the real fun begins. You're suddenly a WWII pilot fighting for one of three countries, in your choice of aircraft. There may be up to 50 other players from around the country sharing the sky with you—or trying to knock you out of it. The newest version adds both European and Pacific theaters of operation, as well as WWI and Korean-era aircraft. *Air Warrior* is a far cry from the early BASIC games that used to be popular on BBS systems.

The newest entry into the online gaming fraternity is the Sierra Network (TSN). At the moment it's a fairly limited service, offering games such as backgammon, cribbage, checkers, and bridge. But this flat-rate service, currently available in California, plans to expand to offer more sophisticated games in the coming SierraLand and adult-oriented LarryLand extensions. New games should come online as the service moves to national availability.

The late 1980s saw an online gaming renaissance. Since then, games have become multiplayer, graphical, and more personal, even on the big networks.

Interestingly, TSN is a combination of the mainframe and BBS gaming techniques. When you call TSN, you're actually calling the host computer closest to your geographic area. If you want to play a game with someone across the country, you can, as TSN computers are networked using the same Tymnet network used by major online services. Your local TSN computer simply hooks up with your friend's local node, and you can still play across the country without incurring long-distance charges. TSN is still in its infancy, but it may portend what we can expect from online gaming in the future.

What are your favorite online games? Drop me an E-mail note at 75500,3602 on CIS, DENNYA on BIX and GEnie, or DENNY on Plink. ❐

HOME OFFICE

COMPUTE CHOICE. To get your PC housekeeping chores under control, no other toolkit does the job like this longtime favorite.

Tony Roberts

PC TOOLS 7.0

A few versions back, *PC Tools* was a compact set of utilities—an easy-to-handle tool belt of programs to make computing smoother. Today it would take a pickup truck to hold everything that's packed into robust *PC Tools* 7.0.

If you've been computing for any length of time, you've no doubt assembled a collection of programs that do many of the things *PC Tools* does. If you're in the market for any one utility—say a backup program, a disk cache, a DOS shell, hard disk diagnostics, a disk optimizer, or a virus detector—you can get that and a whole lot more in *PC Tools*. While an impressive collection of utilities, *PC Tools* 7.0 falls a bit short of perfection. There are some apparent incompatibilities between elements of this software and some memory managers, some versions of DOS, some hardware, and some other software. Part of this problem, though, stems from the fact that much of this software must be or can be run memory resident, and memory-resident software causes conflicts by its very nature. Some users will have difficulty installing and using *PC Tools*. With so many TSRs running loose, there's a good probability of conflict. It will take experimentation and monitoring to set up a *PC Tools* system that's stable and safe.

The difficulty starts during the *PC Tools* installation process. Although it's possible to install individual elements of *PC Tools*, the tendency to want to install it all—all 7.2 megabytes of it—to see what everything does will override most users' intentions to save hard drive space.

This can be like letting a baby organize your button box. Suddenly, your carefully tuned system is choking on a plethora of new TSRs; you're fiddling with command line switches and kicking the dog as crash follows lockup and you don't know what to blame. You can't learn how to run 15 or 20 programs at once, so when you install *PC Tools*, proceed methodically.

PC Tools comes packed with seven books of documentation, each dedicated to a different facet of the software. Despite this segregation, finding information is sometimes difficult because some programs are covered in more than one manual and the indices are not cross-referenced.

The hypertext-style, online help files provide excellent guidance while you're learning the programs, but since the help files occupy 1.2MB, they didn't last long on my overcrowded hard disk.

PC Tools' installation and configuration programs help set things up for you, and they will take care of rewriting your CONFIG.SYS and AUTOEXEC.BAT files if you like. This is fine with plain vanilla setup files, but *PC Tools* unraveled my AUTOEXEC.BAT, which includes several questions and ERRORLEVEL tests regarding the software I want to load. Still, I put these inconveniences out of mind once I got a handle on what this most recent version of *PC Tools* offers. *PC Tools* 7.0 provides a backup program, an undelete utility, and a program launcher that are bona fide *Windows* applications. The *Windows* backup can run in the background and can be scheduled to perform unattended backups at a specified time, if you have a tape drive. The rest of the package, including *PC Shell*, can be run under *Windows* as DOS applications.

Central Point Backup—a solid disk-backup utility that is also sold as a stand-alone program—is aging nicely. This incarnation comes with a DOS version and a *Windows* version that are compatible. You can make a backup in *Windows* and restore it in DOS. Configuration options are myriad. You can save named setup files so it's easy to do a full backup one day, an incremental backup another day, and a backup of only *PageMaker* documents on a third day.

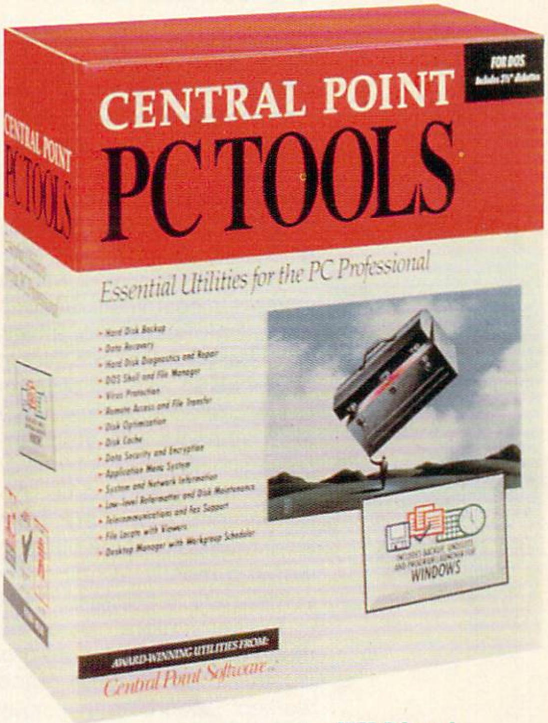
Like *Central Point Backup, Commute* is also offered as a stand-alone program and is just as welcome in this bundle of utilities. A remote computing utility, *Commute* permits connection of two systems across a network, via modem, or by direct link. With this software you can control your computer at work from your laptop or home computer; you can transfer files and run applications from afar.

Don't dread the day your PC contracts a virus any longer. *VDefend, PC Tools'* memory-resident virus detection utility, scans for hundreds of known viruses. However, running *VDefend* slows performance noticeably, and *VDefend* can only detect, not eradicate, viruses. *Central Point Anti-Virus* (sold separately) takes care of that chore. *PC Tools' DiskFix* and *Backup* programs scan for viruses while they work, so you'll have some measure of protection even if you ignore *VDefend.*

Enhancements made to the *DiskFix* utility include interleave tuning and low-level reformatting for those hard drive controllers that will permit it. During repair, you're allowed to save crucial disk information to a floppy so you can undo the repair if you want. *Unformat* will help recover an accidentally formatted disk. *Compress,* the defragmenter and disk organizer, has some useful new options for compression technique and file sorting.

PC Tools 7.0's *FileFix* program adds the ability to repair damaged *dBASE, Lotus,* or *Symphony* files. *Undelete* allows recovery of files that have been accidentally erased. This program works similarly to DOS 5.0's Undelete command. In fact, Central Point Software licensed versions of its *Mirror* and *Undelete* utilities to Microsoft for use in DOS 5.0. An added feature of the *PC Tools* version, however, is *Delete Sentry. Delete Sentry* works by moving deleted files to a hidden subdirectory on your disk rather than actually erasing them. The system then can be set to purge erased files after a specified number of days. All of the memory-resident parts of the *PC Tools* package can be loaded into high memory, if available on your system, leaving acres of conventional memory available for application programs. In addition, much of the software in this package has been made compatible with Netware networks.

PC Tools 7.0 also includes a new *Windows*-like graphical interface for all its components. A new Application Menu System lets you run *PC Tools* utilities and other DOS applications from a configurable cascading menu. *PC Shell,* a DOS-based file management system, now permits viewing of files in more than 35 different formats. *Desktop Manager* offers a suite of functions including appointment scheduling, telecommunications and fax board support, notepad, outliner, autodialer, *dBASE*-compatible database, calculators, and macro editor. The many options offered by *PC Tools* mean flexibility for you. If you like working from a shell, you can use *PC Shell* as your base and launch programs from there. On the other hand, if the command line suits you, you can execute any program from the DOS prompt. Although few will use every program in this package, I can't imagine anyone who couldn't find almost daily use for some of this software.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While I encountered no major problems with *PC Tools,* I did manage to lock the system up several times. I found that the Find Duplicates portion of the *Find File* program hung up every time under DR DOS 5.0, but it works fine under MS-DOS.

You could buy several products to handle the chores *PC Tools* handles, or you could just buy *PC Tools.* No other package bundles so much in one box. Despite the minor problems mentioned here, *PC Tools* never comes up short in the usefulness department. ❐

IBM PC and compatibles, 640K RAM, hard disk (Windows applications require Microsoft Windows 3.0 and 2MB RAM); supports mouse, Netware 2.15 and above, and Netware 386—$179

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WORKPLACE

Daniel Janal

YOU CAN GO HOME AGAIN

How would you like to escape the perilous drive to work and still not miss the excitement and intrigue of office politics? Why not convince your boss to let you do some work at home? After all, the commute is about 30 seconds, and you get to see your kids grow up.

These days, over 5 million workers telecommute, according to Link Resources, a New York–based think tank. Not to be confused with the self-employed, telecommuters make arrangements with their employers to divide work time between office and home. Arrangements can vary from working mostly at the office to working mostly at home—or somewhere in between.

Telecommuters can be as much as 20 percent more productive than full-time office workers, according to a study conducted by the state of California, which has its own telecommuting policies. Brad Schepp, who has documented the phenomenon in his book, *The Telecommuter's Handbook* (Pharos Books, $9.95), says telecommuting can not only enhance the quality of your life, it can also benefit your employer.

Look homeward, boss. That's where you may find your best employees.

Large corporations such as Pacific Bell, Apple Computer, AT&T, and JC Penney offer telecommuting as an option for certain employees. Their efforts have paved the way for other companies to formalize policies. "Everything in the program is clearly spelled out," Schepp says, "who can telecommute, how they stay in touch with coworkers and supervisors, and how the company applies workmen's compensation laws."

Such companies aren't the norm, however. Some 90 percent of companies that offer telecommuting do so informally. Mid-level managers don't want to involve top management and the inherent red tape that follows. Telecommuting goes against the grain. MBA programs don't condone it, and employers are only beginning to understand the unique problems of two-income households. You might have to shop around to find a company that's interested in having employees telecommute. That type of company will make it worthwhile.

Other issues that make companies reluctant to offer telecommuting are providing workmen's compensation for accidents at home, managing numerous off-site employees, and determining the best candidates to work at home.

The best telecommuters tend to be those employees who have good working relationships with their supervisors, have been with the company for a long time, can work independently, are good communicators, and are proven performers. And some positions are better suited than others to telecommuting. Computer programmers, writers, translators, sales reps, stockbrokers, and attorneys, to name a few, fall into that category.

Schepp says the best telecommuters are "information specialists" in jobs that involve three basic stages: research, execution, and presentation. For instance, an architect meets with a client to discuss house plans, goes home to sketch out the blueprints, and then meets with the client again for a presentation.

Schepp says that it's in the second stage, when the work is produced, that telecommuting can be most effective. "That's where you need solitude. You need space and peace to do the best possible job," he says.

Because interaction is limited, the person must become adept at communicating with coworkers and supervisors and work harder to stay in touch via fax, E-mail, and the phone. "You've got to do what you can to ward off feelings of isolation," Schepp says.

Successful telecommuting programs aren't made in heaven, however; they're written on paper, with the guidelines spelled out and paths and tasks clearly defined. Schepp advises companies to hire specialists to set up programs for telecommuting. "They can help you avoid the mistakes other companies have made," he says, "and they can hold your hand through the entire process."

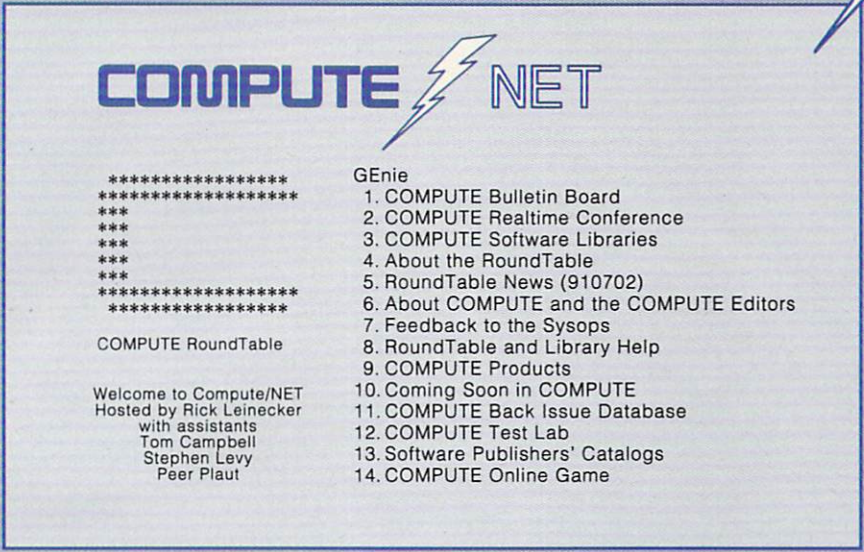
That workstyle isn't for everyone, however. Some 20 percent of telecommuters eventually return to the office for various reasons, often because of an inability to concentrate.

If telecommuting sounds like your answer, Schepp advises you to start slowly. "You'll find it's a learning process. You may find you aren't as productive at first—you have to get used to distractions or not having a support staff or a copy machine. You have to get used to other ways of communicating with people. And you show up at the office fairly often."

Showing up is fine—as long as you can go home. ❐

INTRODUCING

COMPUTE/NET



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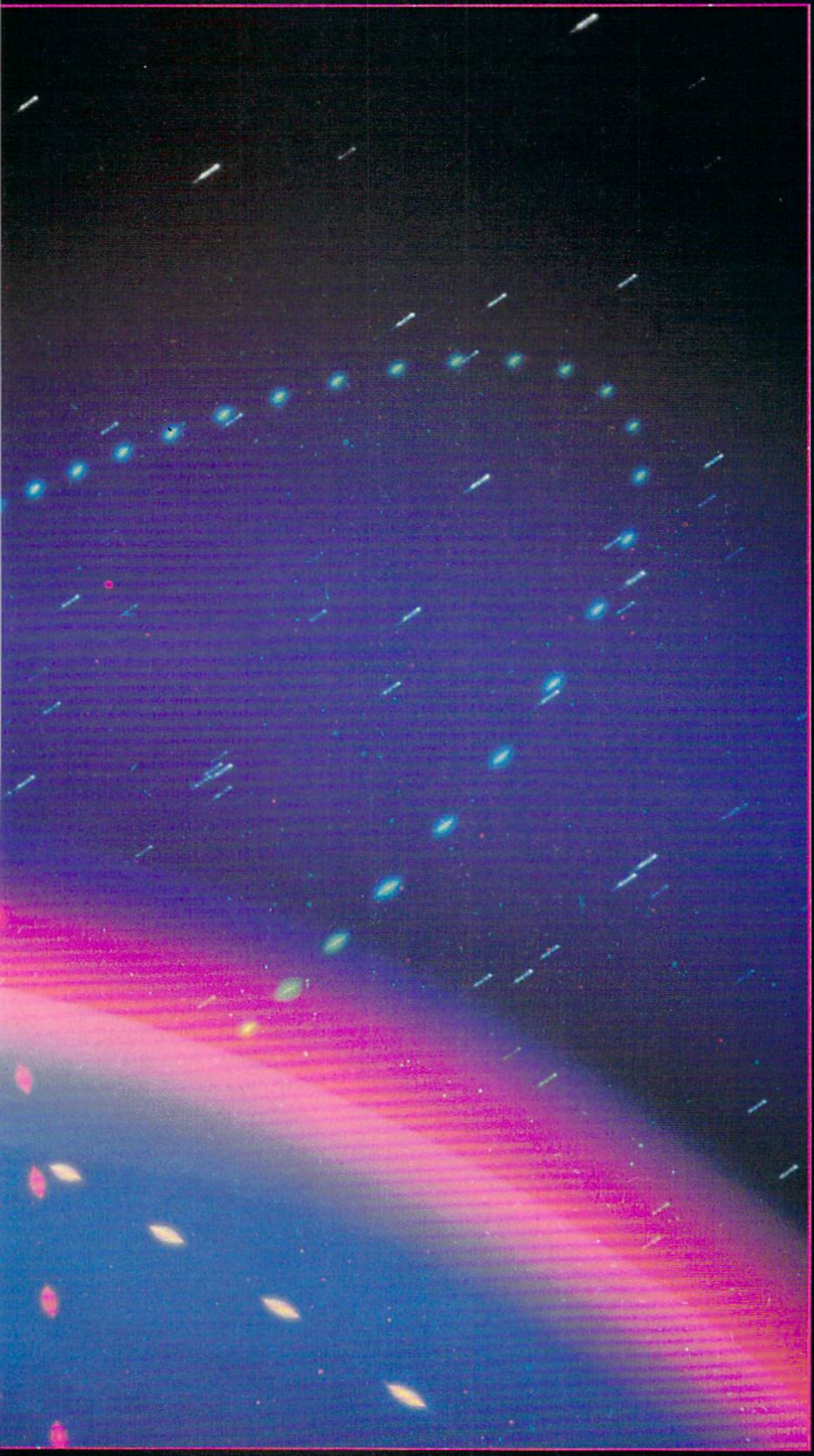


MORE AND MORE
EMPLOYEES
ARE WORKING FROM THEIR
HOME OFFICES.
HOW CAN YOU GET INTO
TELECOMMUTING?
READ ON.

REMOTE POSSIBILITIES

BY ROSALIND RESNICK

Ask most people to describe their dream job, and they'll start talking about great pay, top benefits, flexible hours, a short commute, and loads of quality time to spend with the family.

Mention the word *telecommuting,* though, and you'll get a blank stare.

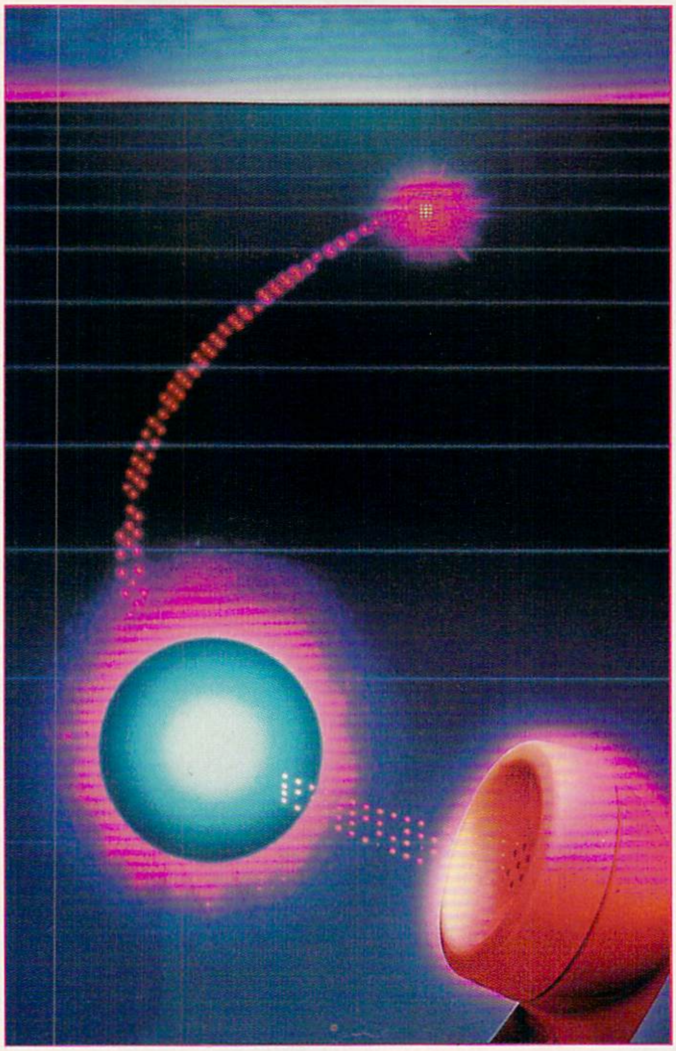
Telecommuting—commonly defined as working from the home or a remote location via personal computer, phone, fax, and modem—has been around for years, but it's only now beginning to catch on in a big way. Link Resources, a New York research firm, estimates that nearly 4 million U.S. employees telecommute on at least a part-time basis with more than half a million telecommuting full-time. Just five years ago, there were fewer than 100,000 telecommuters nationwide.

Who Needs It?

"Telecommuting is like a lot of other new ideas," says Gil Gordon, a Monmouth Junction, New Jersey, consultant and publisher of "The Telecommuting Review," a newsletter for employers. "I always like to remind the skeptics that when the Xerox machine first came out, people said, 'Why do you need that? We have carbon paper.' Telecommuting is one of those rare things that works out well for both employee and employer."

In other words, what's good for the worker has suddenly become good for corporate America. With the recession forcing companies to pinch every penny, more and more managers recognize that there are sizable bottom-line benefits to letting employees work from home. Not only are telecommuters happier and more productive, studies show, but having fewer workers at the office or production plant means reduced expenses and overhead. Telecommuting also lets employers attract and retain topnotch employees who live far from the office, suffer from a disability, or need to stay home to care for a young child or an elderly relative.

Companies and government agencies that offer telecommuting include IBM, American Express, J.C. Penney, General Electric, Los Angeles County, and the Washington State Energy Office. Apple Computer, whose San Francisco Bay area employees face an arduous commute choked with traffic and pollution, has started giving workers a $1 credit in the company store every time they work from home.



Productivity and Price

Many bosses say they've been pleasantly surprised by how well their companies' telecommuting programs have worked out. National studies show that productivity can jump by as much as 20 percent when employees are allowed to work from home.

"I was apprehensive at first," says Marti Nurse, director of appeals and state hearings for the Los Angeles County Department of Public Services, who counts 35 telecommuters among the 103 staffers she supervises. "But as our caseloads have gone up, the people who are telecommuting are doing more work, and they're doing it better."

For Los Angeles County, which boasts one of the nation's largest telecommuting programs, employer altruism is a matter of dollars and cents. According to Nancy Apeles, the program's assistant manager, clerks who work from home for the county assessor's office work 64 percent faster than their counterparts in the office and save the county $30,000 a month. Of the 80,000 people who work for the county, more than 1200 now are telecommuters, up from 78 when the program was launched three years ago. "It's a win-win situation," says Apeles.

Who's Who

Who are America's telecommuters? Many are mothers with young children. Computer programmers tend to gravitate to telecommuting, while other telecommuters are technical writers, telephone operators, and data-entry clerks.

Los Angeles County, which numbers more than 1,200 telecommuters among its 80,000 employees, boasts 200 different telecommuting job classifications ranging from clerks and social workers to auditors and department heads.

Jim Mitchell, 50, chief of contract monitoring for the Los Angeles County Health Department and a self-described modem junkie, set up an electronic bulletin board for his 14 telecommuting employees to swap messages. He himself works from home 4½ days a week.

"I do my real thinking at home," says Mitchell, who still comes to the office for a weekly staff meeting. "I think that companies that do not offer this option are going to find themselves behind the curve when it comes to recruiting."

More typical of the telecommuting population are people like Lisa Kilmain, 28, a senior associate programmer at IBM in Irving, Texas. Kilmain wasn't ready to go back to the office full-time when her daughter, Caitlin, was born two years ago. But part-time work didn't pay enough to justify what she was spending on day care. Thanks to IBM's Work-at-Home pilot program, Kilmain spent six months as a telecommuter, tapping away at her PS/2 Model 70 while Caitlin napped.

"I got a lot done at home while she was sleeping," Kilman says. "People couldn't walk into my office and say, 'Hey, what did you do last night?' "

"Being a parent myself, I knew the importance of the mother's being present," says Ed Denson, Kilmain's boss. "It was good for the company, too. Lisa was able to accomplish more in her 20 hours at home than she would have in the office."

Though Kilmain is now back at the office, she says she's planning to have more children and hoping to repeat her telecommuting experience.

Chris Stroud, vice president of Financial Data Planning (FDP), a Miami software company, tells a similar story about Laura Falco, 28. Falco, a programmer who also fields phone calls from customers, cares for two young children at home while telecommuting 35 hours a week. Though FDP has no formal telecommuting program, the company has allowed Falco to work from home for the last 2½ years because she's a talented self-starter. FDP also picks up the tab for a second phone line.

"After my daughter was three months old, I didn't want to go back to work," Falco says. "I wanted to take care of her. The company said it was willing to try [letting me telecommute] for three months. Now, it's been two-and-a-half years."

Some of her colleagues are even a little envious. "There have been other people who have pointed to Laura and said, 'She's doing it. Why can't we?'" Stroud says. "But Laura's job is very suited to working from home, and she's an extremely productive person."

Out of Sight

As Falco's story shows, telecommuting is still a privilege, not a right, even at the companies that do allow it. The reason: Many managers worry that home-based employees will be tempted to sleep late, watch television, raid the

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refrigerator, or take their kids to the park rather than do their jobs.

Likewise, many employees fear that, once out of sight, they'll be out of mind—passed over for raises and promotions.

If you're willing to take that risk and you want to persuade your employer to let you telecommute, the experts suggest you try the following approaches:

- Put yourself in your boss's shoes. Show your boss that telecommuting can save the company money by shrinking overhead. Point out that employees who work from home are often more productive and can keep working in spite of minor illnesses and family emergencies. Explain that telecommuting helps boost morale and keep good workers.
- Show initiative. Prove that you've got what it takes to work from home—self-discipline, organization, and the ability to handle tasks and meet deadlines without direct supervision. Demonstrate these qualities at the on-site job you have now.
- Start small. If your boss won't let you telecommute full-time, ask to try telecommuting one day a month. Once your employer feels comfortable with the idea, you can start lobbying for one day a week, two days, or more.
- Work hard. Even if your boss gives you the green light to telecommute, that doesn't mean you can't be hauled back to the office if your performance falls short. Telecommuters are expected to meet the same productivity standards as staffers who work in the office.
- Be flexible. If your boss wants you to report to the office once a week for a staff meeting, don't fight it.

Trends and Anomies

Telecommuting experts believe that working from home is an emerging trend in the workplace of the 1990s, not just a flash in the pan. With advances in computer and telecommunications technology, people can perform more and more jobs from home.

"It's not just women with kids sitting behind the keyboard," says Gordon, the telecommuting guru. "Many more men are becoming interested in it, too."

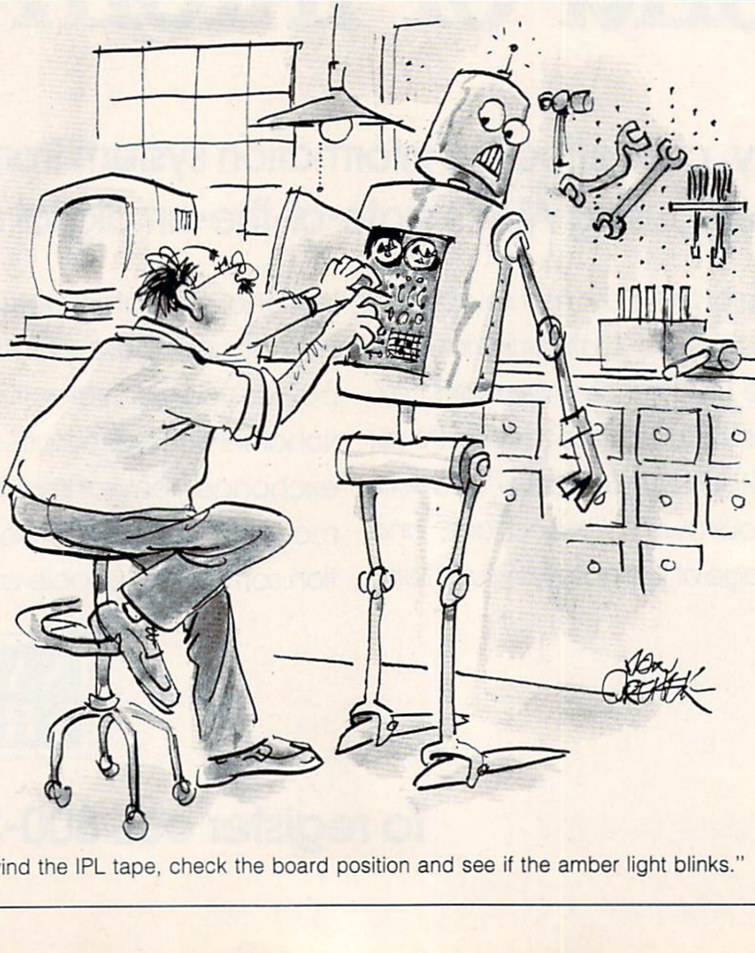
But not even telecommuting's staunchest backers envision a future littered with empty office buildings and urban ghost towns. The reason? A basic human need to talk, meet, and gossip with fellow workers face to face. Gordon predicts that no more than 5 to 10 percent of the nation's work force will telecommute at any one time.

"Telecommuting is not about working at home," Gordon says. "It's about decentralizing the workplace. For the right people and the right reasons, it has tremendous value." ❐

BOOKS ON TELECOMMUTING

There are several publications on telecommuting, including *Telecommuting: How to Make It Work for You and Your Company,* by Gil Gordon and Marcia Kelly (ISBN 013902339-9, Prentice-Hall). To order a copy, contact Gordon at 10 Donner Court, Monmouth Junction, New Jersey 08852; (908) 329-2266. The price is $15.95 for U.S. orders and $25.95 for foreign orders. Price includes shipping. Gordon also edits "The Telecommuting Review," a monthly newsletter geared toward employers. A subscription costs $157.00 per year. The address and telephone number are the same.

Other books include *The One-Minute Commuter* by Lis Fleming (ISBN 1-877887-14-5; Acacia Books, 1309 Redwood Lane, Davis, California 95616; 916-753-1519; $9.95 plus $2.00 postage and handling; California residents should add $0.75 sales tax), *The Telecommuter's Handbook* by Brad Schepp (ISBN 0-88687-571-4; Pharos Books, World Almanac Education, 1278 West 9th Street, Cleveland, Ohio 44113; 800-521-6600; $9.95 plus $1.50 postage and handling), and *Working from Home: Everything You Need to Know About Living and Working Under the Same Roof* by Paul and Sarah Edwards (ISBN 0-87477-582-5; Jeremy P. Tharcher, 5858 Wilshire Boulevard, Suite 200, Los Angeles, California 90036; 213-935- 9980; $14.95).



"Rewind the IPL tape, check the board position and see if the amber light blinks."

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And that's not all. To make *PC Disk* as easy to use as possible, each issue contains *CMOS—COMPUTE's Menu Operating System*—a special menuing program that allows you to fly through installation, run programs, view and print documentation, get special tips on program requirements, and more.

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ARTS & LETTERS

Robert Bixby

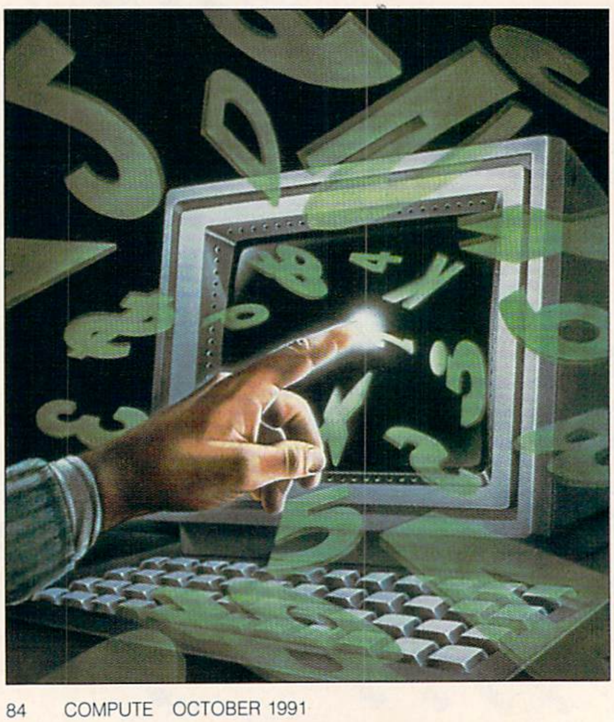
TAKING THE VENTURE OUT OF A PUBLISHER

You can't use *Ventura Publisher* for very long without grudgingly admitting that it has a few flaws. It lacks two-up printing, for example, and a few other little things that would be nice to have. Fortunately, *Ventura* is popular enough to make it profitable for small programming companies to create utilities to fill in the gaps.

EDCO (EDCO Services, 12410 North Dale Mabry Highway, Tampa, Florida 33618; 813-960-2356) is such a company. EDCO provides simple solutions to two *Ventura* deficiencies most vexatious to typesetters: hyphenation and kerning.

The hyphenation problem involves words improperly hyphenated according to the standard dictionary. This shows up when a word containing a syllable of a single character appears at the end of a line—*Ventura* often breaks words incorrectly. The *EDCO Hyphenation Dictionary* is free of these errors, and it allows you to enter new words in the dictionary, complete with specified hyphenations to prevent errors from occurring. You can even specify how many letters should appear before and after a hyphen to prevent short words from breaking at all and long words from breaking before or after single letters.

Ventura Publisher seems designed to frustrate the simple creation of a saddle-stitched booklet.



LetrTuck is an interactive kerning engine that allows you to adjust the kerning of letter pairs in the 24 most popular PostScript fonts: roman, bold, italic, and bold italic forms of Avant Garde, Bookman, New Century Schoolbook, Palatino, Helvetica, and Times. You can specify a change of as little as 1/1000 of an em space. You can even enter letters not ordinarily kerned and specify a kerning value. *LetrTuck* and the *EDCO Hyphenation Dictionary* are available for $99 each or $148 for both.

2Up Publisher (Laser Age Software, 3231 Ocean Park Boulevard, Santa Monica, California 90405; 213-470-1397; $159) is another interesting package designed to make up for what I consider a glaring inadequacy in *Ventura:* the lack of two-up printing. Two-up means setting up your pages so the resulting printout can be folded into booklet form.

With *Ventura* you can create landscape pages with two frames side by side, but then there's the problem of pagination. Laying out a booklet unassisted is both a nightmare and a headache rolled into one. To create a 32-page booklet, you could spend hours cutting and pasting text to get it in the right positions, and page numbers have to be entered by hand. That's a lot of work you shouldn't have to do.

It seems that *Ventura* is designed to frustrate creation of a simple saddle-stitched booklet, but thankfully, *2Up Publisher* is designed to take care of that problem. You simply create pages in *Ventura Publisher* using a special format described in the *2Up Publisher* manual and then print them to a file. *2Up Publisher* then extracts the pages from the file and rearranges them so they can be saddle-stitched.

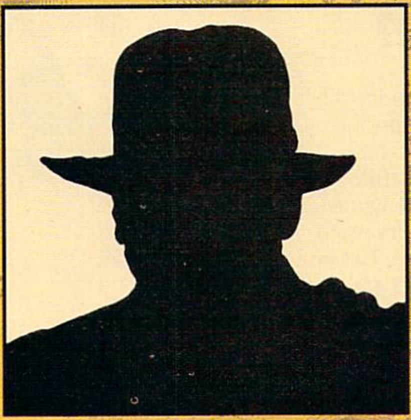
2Up Publisher only prints to a PCL printer, meaning it uses only PCL font files. If you're used to printing from *Ventura for Windows* to a PostScript device, the result is an unacceptable change of available fonts. Nonetheless, once you've set up *Ventura* to print in the appropriate format and made the necessary adjustments, *2Up Publisher* will generate perfect pages as advertised.

As I've mentioned before, I'm a man on a quest; I'm looking for the perfect pointing device to replace the mouse. The news from Quixoteland is that I may have found my true love—a device that makes pointing easier and allows me to draw with a natural motion. The creature's name is MousePen (Appoint Systems, 1332 Vendels Circle, Paso Robles, California 93446; 800-448-1184; $109), and though it's a little fat around the middle, it works like a real pen.

You can hold it like a pen, draw on your mouse pad as if it were a sketch pad, and even draw with it on other surfaces, provided they aren't too slick. The mouse ball is a bead with a smooth finish rather than the rubber-coated ball bearing found in most mice.

Although I have several standard mice standing by to take the MousePen's place, I haven't rushed back to them yet. If the MousePen barrel can be made thinner, this sharp new input device will border on perfection. ❐

The man with the hat is back.



This time he's in over his head.

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WHERE IN AMERICA'S PAST IS CARMEN SANDIEGO?

WANTED
WHERE IN AMERICA'S PAST IS CARMEN SANDIEGO?
USER'S GUIDE
ACME DETECTIVE AGENCY ISSUES ALL POINTS ALERT
WHAT HAPPENED WHEN

Ever since the indomitable Carmen Sandiego began her capers back in 1985, computerists the world over have been trying to track her down. But whenever she's busted, Ms. Sandiego gets back on the streets faster than a jail door swings. You just can't keep a bad woman down. After wreaking havoc in *Where in the World Is Carmen Sandiego?*, *Where in the U.S.A. Is Carmen Sandiego?*, *Where in Europe Is Carmen Sandiego?*, and *Where in Time Is Carmen Sandiego?*, she's back with her trusty time machine, causing trouble across the length, breadth, and history of the United States of America.

In *Where in America's Past Is Carmen Sandiego?*, you hop in your Chronoskimmer 450SL and follow the Sandiego gang as they leap from time to time, starting prior to 1800 and going all the way up to the present day. (Well, up to 1988, anyway.) Although your goal may be a good arrest, along the way you'll learn much about important times in America's history, from the discoveries of the first explorers to the inventions of Thomas Edison to the introduction of rap music.

A typical game begins when ACME headquarters briefs you on the most current V.I.L.E. (Villains' International League of Evil) caper and issues you a Chronoskimmer for a specific period of time. At the start of a case, you know only the crime and the criminal's gender. To complete your mission, you must identify, locate, and arrest the criminal before your time expires. The execution of most commands consumes time, so you must examine clues carefully and avoid taking unnecessary trips or requesting redundant information.

Because Brøderbund's America is divided into five geographic regions, each of which can be visited in any of nine time periods, guesswork will yield poor results. You must examine each clue to determine both the region and time period to which the criminal has fled. The game's documentation advises you to "refer to your personal volume of *What Happened When*." Study this impressive tome carefully and become thoroughly familiar with its organization. The book contains far too much information for anyone to simply memorize.

Luckily, your first time jump is automatic, zapping you to the last place the criminal was sighted. When you arrive at your destination, your view screen offers a scene from the region in the appropriate time period, after which you start your investigation by choosing Ask a Bystander, Consult a Source, or Listen In. Whichever clue you choose, the interviewee will give information that may point to the criminal's next destination, time period, or both.

For example, a typical clue may read, "She said she was going to donate copies of the new book, *Uncle Tom's Cabin*, to a library in Austin." By looking up books in *What Happened When*'s index, you find *Uncle Tom's Cabin* listed with a publication date of 1852. You now know your target has fled to the Southwest (Austin) in the year 1852 (you've also learned a little about classic literature, but don't let that worry you), and you didn't even have to read the full entry in the book! Pressing the Chronoskimmer's map button brings up a map of the U.S. on your view screen. You select the 1850–1875 time zone and the Southwest region and press the launch button, and you're off.

When you arrive in the Southwest, you learn that "the first Texas cattle drive began in 1866 when a herd of 260,000 cattle was moved north, proving that cattle could be driven to market." Interesting though this fact may be, it doesn't help your search. But pressing the Search button allows you to question the witnesses.

As you search for clues, headquarters may send electronic mail, which gives you the latest lowdown on your suspect. Clues like "She had ruby-colored hair" let you narrow down the suspects. Enter the information into your crime computer. Once you know enough about the villain, you're issued a warrant.

The game continues in this fashion until you capture the suspect or run out of time. Sometimes, you may catch up with the suspect before you have a valid warrant, in which case, the suspect gets off— and you get chewed out by headquarters. If you end up with a warrant for the wrong person, you'll really feel like a dink.

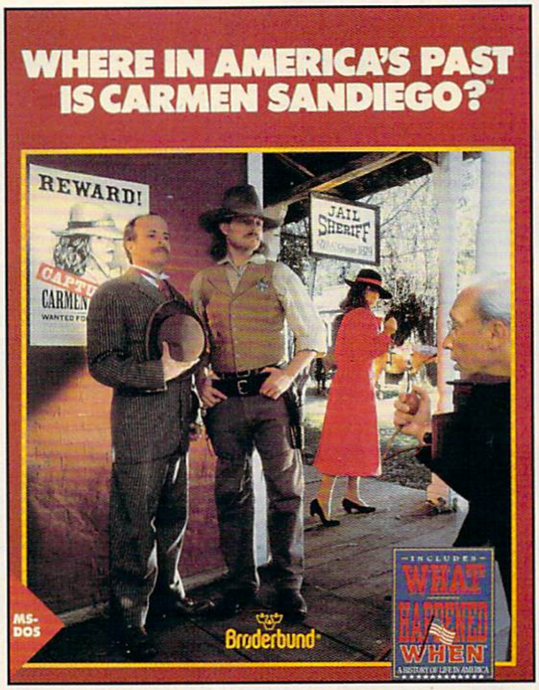
Where in America's Past Is Carmen Sandiego? supports most graphics modes, including CGA, EGA, and VGA. Although obviously best played in VGA mode, the game's EGA mode is an acceptable alternative, with the CGA graphics being better than one might expect but still tough on the old orbs. The VGA graphics are stunning, with many scenes rendered from digitized photos.

Not all the graphics are static scenes, however. Each time you jump to one of V.I.L.E.'s locations, a Sandiego henchperson makes an appearance in a carefully crafted, always amusing animation. I won't give away any of the surprises. Suffice it to say that, with a full dozen of these cartoonlike intermissions built in, you'll continue to enjoy them for many games. (If you don't see an intermission after a time jump, you jumped to the wrong location or time.)

While the straight PC-generated sound effects are OK, this game puts sound cards like Ad Lib and Sound Blaster through their paces. The professionally composed music is reminiscent of that of hard-boiled detective dramas, with a splash of sexy-cool jazz thrown in to keep you grinning and bobbing. The sound effects accompanying a time jump rattle your chair and echo spookily as you snap into your chosen slot in history.

No software is perfect, of course. When played using a Sound Blaster card, *Where in America's Past Is Carmen Sandiego?* sometimes leaves a note or two hanging, yielding a droning sound that can drive you wacky if it goes on too long. (This also may happen with other sound cards.) I also didn't care for the method by which the player gathers clues. Any software built upon a fictional scenario must maintain that all-important suspension of disbelief. Clicking on a button labeled *Ask a Bystander* or *Listen In* reminds you that you are, after all, just playing a game. It would've been much more effective to have a person's portrait pop up, as though you were truly questioning people met randomly in the street. As the game stands, the Clue buttons might as well be labeled *Clue 1, Clue 2,* and *Clue 3* for all they add to the game's scenario. These are minor quibbles, however, when compared with the overall quality of the program.

Although the gameplay varies only slightly from one title to the next, these games continue to be entertaining and, best of all, painlessly educational—a tough combination to beat. As parents proved to their kids over five years ago when the first charming Carmen Sandiego adventure was released, learning can be fun. *Where in America's Past Is Carmen Sandiego?* is a must-have package for anyone interested in superior and engaging educational software. ❒



IBM PC and compatibles; 512K RAM for CGA, EGA, Tandy 16-color, and Hercules; 640K for MCGA and VGA; hard drive; supports mouse or joystick; supports Roland MT-32, Sound Blaster, Ad Lib, LAPC-1, and CM-32L—$59.95

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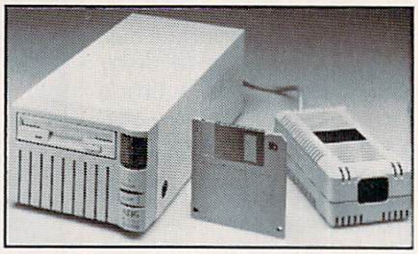

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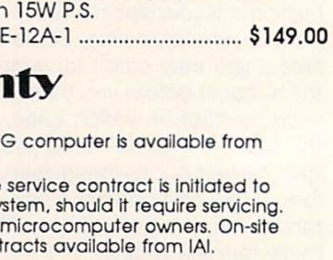

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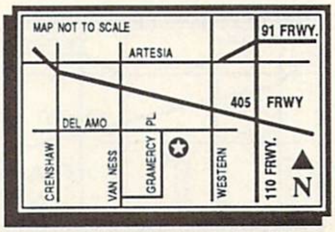

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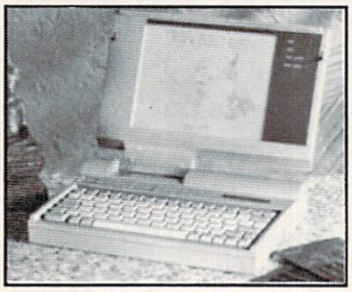

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- 1MB RAM expandable to 5MB
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- 640 x 480 Black & White supertwist CCFT LCD display, up to 32 grade scale
- Fully VGA, EGA, Double Scan CGA, HGC and MDA compatible
- Removable/rechargeable Ni-Cd battery
- Weight 6.6 lbs. with battery pack
- MS-DOS 4.01 & GW-BASIC
- MS-Windows 3.0 & MS-Works 2.0 are optional
- FCC approved

$2,399

LX2020 Laptop

Ideal for Beginning PC Users

Economical and Easy-to-Use Laptop with a contrast-adjustable LCD screen

Features Included...
- V20 microprocessor with 12/4.77MHz
- 640KB RAM with AMI Bios
- 20MB Hard Disk and one built-in 1.44MB Floppy Disk Drive
- 640 x 200 Supertwist LCD Display
- MDA and CGA compatibility
- RS-232, Parallel Printer, External Video and External Keyboard Ports
- MS-DOS 3.3 & GW-Basic
- MS-Works 2.0 is optional
- FCC approved (adaptor is also UL approved)

$1,029⁰⁰

ARCHE™
MONITORS

PX-214MH Super VGA

NEW!! Non-Interlaced
- SVGA—1024 x 768, 800 x 600, 640 x 480
- Auto-Size, Super Fine VGA Graphics
- Hitachi CRT—Dot Pitch Super Fine 0.28
- Black Screen for 50% better contrast
- Non-Glare Screen
- Triple Focus 3 Beam System for crisp bright colors
- Tilt & Swivel Stand & Cables included
- Dual Voltage Power Supply (50-60 Cycle)

$449

PX-14S Super VGA

- SVGA—1024 x 768, 800 x 600, 640 x 480
- Comb Filter to eliminate smearing
- Super Fine VGA Graphics Monitor
- Hitachi CRT—Dot Pitch Super Fine 0.28
- Non-Glare Screen
- Triple Focus 3 Beam System for crisp bright colors
- Tilt & Swivel Stand & Cables included
- Dual Voltage Power Supply (50-60 Cycle)

$349

PX-14S VGA

- VGA—640 x 480
- Comb Filter to eliminate smearing
- Fine Grain VGA Graphics Monitor
- Hitachi CRT—Dot Pitch 0.39
- Non-Glare Screen
- Triple Focus 3 Beam System for crisp bright colors
- Tilt & Swivel Stand & Cables included
- Dual Voltage Power Supply (50-60 Cycle)

$299

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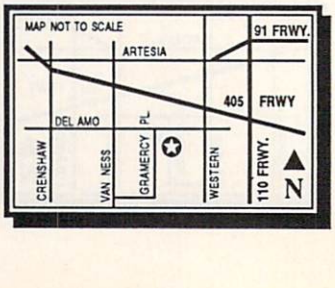

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SIIG, Inc

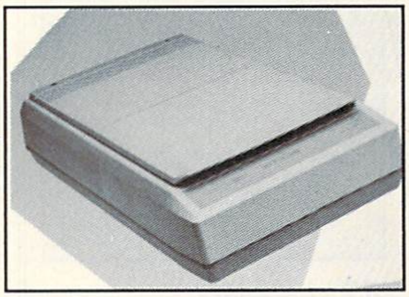
SIRIUS-32GS GRAY-SCALE

The SIRIUS-32GS offers Gray-scale mode, as well as virtual gray-scale and single-bit scanning modes.

The SIRIUS-32GS scanner is a valuable tool for transforming photos and other images into graphic images for use in computer applications. With its 256 shades of gray, image clarity and accuracy are unsurpassed. Industry standard 1-, 4-, 8- and 24-bit TIFF file formats are fully supported. The scanner package includes IMS (Image Manipulation System) software, gray-scale graphic manipulation program developed by VI&C Technology.

FEATURES WITH IMS (Image Manipulation System):

- Manipulate 10 windows simultaneously with full & reduced views
- Supports expanded, extended, and virtual memory configuration
- Supports popular Laser and Dot Matrix printer, color or monochrome monitors
- Mouse driven & graphic based
- True WYSIWYG color selection to help image manipulation
- On-line user support
- Auto detection for device drivers and configurations
- On-screen dither pattern and gray shade index guidance
- Extensive tools for gray-scale enhancement, editing, and graphic drawing



- Exchangeable editing between gray-scale and binary data
- Many VGA modes supported

$1,399

OTHER OPTIONAL EQUIPMENT:

- Automatic Document Feeder (ADF) Scans up to 25 pages at once. $299.00
- ReadRight 2.0 by OCR Systems, for OCR scanning on 80286 or 8088 based computer. $299.00
- PC Paintgbrush IV Plus for advanced graphic uses $99.00

SIRIUS 32 FLATBED
IMAGE SCANNER

Increase the graphic performance of your office with SIIG's Sirius 32 Image scanner. To optimize and utilize the veratility of this scanner, we offer several interface kits, software geared to your business needs.

$599

INTERFACE KITS

GRAPHIC INTERFACE KIT

S32-DB Interface Card, Scanner Cable, DSart Software, PC Paintbrush IV Plus $149.00

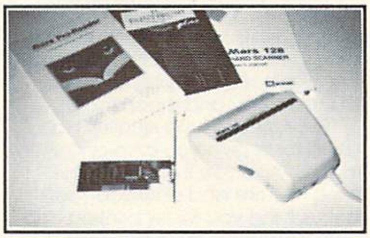
BUSINESS INTERFACE KIT

S32-DB Interface Card, Scanner Cable, DSart Software, OmniPage/386 OCR Software $599.00

DELUXE INTERFACE KIT

S32-DB Interface Card, Scanner Cable, DSart Software, PC Paintbrush IV Plus, OmniPage/386 OCR Software $699.00

Marstek 128
HAND SCANNER



COMPLETE PACKAGE INCLUDES...

- Mars 128 5" Scanner & Interface Card
- Scan Kit Utility Software & User's Manual
- Cat Reader OCR Software & PC Paintbrush Plus
- One Year Warranty

$119.95

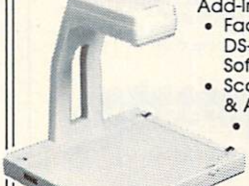
CHINON
ScanFAX 96 /DS-2000

Scanner & Fax Card packaged together for a fraction of the cost.

- 9600 Baud facsimile & Scanner
- Auto-Redial, Telephone Directory & Automatic Cover Sheet
- Log of faxes sent and received

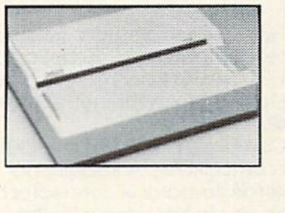
COMPLETE PACKAGE INCLUDES...

- Chinon DS-2000 Scanner
- ScanFax 96 Add-In Board
- Facsimile & DS-2000 Utility Software
- Scanner Cable & AC Adapter
- Optional OCR Software.



$299

QMS IS 300
FULL PAGE SCANNER

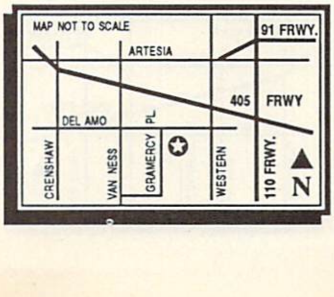


- 300 dpi resolution
- 6 seconds per page
- Complete with Controller Card, Cable & Graphics Software

$318.95

OCR Software Add $149.00

SCANNERS



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UDP

TurboScript 3

PostScript Emulation Cartridge

UDP's PostScript cartridge gives you more than other leading brands!

- **47 Postscript fonts—scalable to any point size**
- **Requires only 1 MB of additional printer Memory**
- **Works on LaserJet II, IIP, IID, and III printers**
- **Supports Adobe Type 1 font formats**

The TurboScript cartridge give you 47 high quality scalable Postscript fonts in any point size, that 12 more than HP's Adobe PostScript or Pacific Data's Pacific Page III Cartridge. It requires 1 MB less printer memory.

TurboScript is ideal for use with desktop publishing and WP applications such as Windows, Pagemaker, Ventura Publisher, Micrografx Designer, WordPerfect, Microsoft Word, Illustrator, Corel Draw and many more.

Postscript features include scaling, reverse type, rotation, shading, patterns, stretching, circles, arcs, clipping path, etc.

Two identical versions available for printer compatibility... TurboScript II for the HP LaserJet II and compatibles and TurboScript III for the HP LaserJet IID, IIP and III.

Compatible with IBM computers and compatibles. An additional appletalk-to-parallel connector box allows you to interface with the Macintosh computer.

$299⁰⁰

Save $100.00

$399.00 Retail Price

TSIII
TurboScript III

47 Scaleable Postscript Fonts... thats 12 more fonts than your standard postcript cartridges!

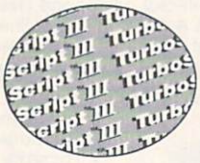
Postscript Effects

Form
Form
Form

Skewed

Outline

Reverse



Clipping path

Impressive

Perspective

Turbo25

More Printing Power with 3.6 to 30 point Fonts

- **Turbo25 gives you fonts from 25 HP cartridges plus headline and zingbat fonts**
- **Contains 152 fonts, 22 character sets and 220 "zingbats"**
- **Includes drivers for most WP software, including the new Windows 3 environment**

T25
Turbo25
Headline Fonts
22 Symbol Sets
Portrait & Landscape
3.6 to 30 point Type

The Turbo25 is designed to provide you with economy, felexibility and versatility. You get the most from your laser printer. Name the application: word processing, mathematics, legal, scientific and technical, tax forms, big bold headlines, spreadsheet... Turbo25 cartridge adds all the right touches, with headline fonts, 22 symbol sets, 3.6 & 4.8 point type for spreadsheets to 30 point type for headlines; portrait and landscape, mono-spaced and proportionally spaced fonts, and much more.

Exceptional type quality. Hand tuned fonts give you crisp and sharp images. And you'll eliminate the need to store and download soft fonts, giving you faster printing and more computer memory.

Works with the HP LaserJet II, IIP, IID and III as well as other HP cartridge compatible printers.

$178⁰⁰ *Save $120.00*

$298.00 Retail

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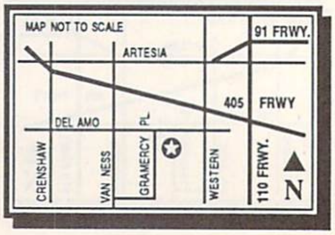

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LASER ACCESSORIES

Pro-65

HP ProCollection Equivalent

- **65 Fonts from the most popular HP typestyle. Many in portrait and landscape.**
- **Lots of legal character sets**
- **Font sizes from 3.6 to 14 points**
- **Largest selection of drivers, provided by software vendors**

The Pro-65 gives you more of the fonts you use everyday. This cartridge is compatible with all HP LaserJets, including compatibles like Epson EPL-6000 and Toshiba PageLaser6.

$129.00 *Save 50%*
$249.00 Retail

Paper & Envelope Trays

For LaserJet II and IID

Letter Size Tray, 200 sheet capacity (#T-LT) $59.00
Legal Size Tray, 200 sheet capacity (#T-LG) $59.00
Envelope Size Tray, 15 envelope capacity (#T-EN) $69.00

Buy 2 Trays
SAVE 15%
Buy 1 set of 3 Trays
SAVE 25%

TurboGold

167 complete font sets,
22 symbol sets and
222 graphic symbols

- It's 3.6 body copy pt. to its 48 pt. headline font makes this cartridge great for wordprocessing
- 3.6 & 4.8 pt. fonts for Spread sheets
- Script fonts from 12 pt. to 48 point makes terrific certificates
- 14 different fonts for scientific and technical typing
- Driver support for many popular wordprocessing & spreadsheet programs, including Windows
- Works with HP LaserJet II, IIP, IID, III, IIID, Epson EPL-7000, Star Macronics, & Star LaserPrinter 4. Other printers may be able to use this cartridge if they emulate one of printers mentioned.

$239.00 *Save $100.00*
$339.00 retail

New!!

UDP MEMORY BOARD for HP LaserJet IIIP. Call.

All UDP Products comes with 60-day unconditional money back guarantee. Ten year warranty on all products.

IBM 4019

Laser Font Card

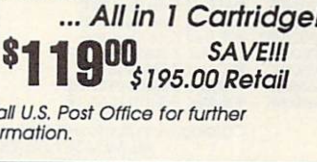
UDP Compatible
Font Card for
IBM 4019 & Compatible Printers

- Packed with 209 Fonts.
- Emulates Pacific Data's "25 In One" cartridge
- All font in portrait; the printer rotates all fonts to landscape
- Come with drivers for many popular applications and Windows 3.0 (with VGA screen fonts) in both HP emulation and IBM native modes.
- ***Plus...*** access to Pacific Data's "25 In One" driver, HP's ProCollection driver, IBM's Universal Card (#800) driver and other drivers for HP and IBM fonts.
- Typestyles: UDP Helv, UDP Tms, Tms Math, Prestige Elite, Math Elite, Courier, Letter Gothic, Presentation, Presentor, Line Draw, PC Line and Tax Line
- Headline fonts, 16 symbol sets, 3.6 to 18 point type

$250.00 *Save $100.00*
$350.00 Retail

C6 Bar Codes & More

Zip+4 Bar Code
*Save 5.7 per Envelope**



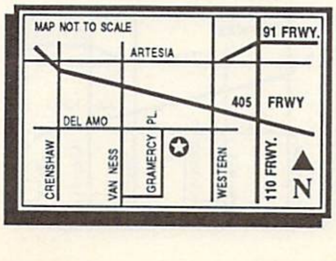
Barcode 3-of-9
12 pt/8.1 pitch
12pt/4.6 pitch
EAN/UPC 10 mil
13 mil

Letter Gothic 9.5 point
Letter Gothic
12 point
Letter Gothic
14 point
Line Draw 12 point
OCR-A 12 point
OCR-B 12 point
US ZP

Plus...
*Bar Code 3 of 9 & *UPC Codes
... All in 1 Cartridge!!

$119.00 *SAVE!!!*
$195.00 Retail

* *Call U.S. Post Office for further information.*



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MEMORY PRODUCTS

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IBM PS/2 MEMORY

CAT. #	DESCRIPTION	NSI
30F5348	512KB Upgrade PS/2 30 286	44.00
30F5360	2MB Upgrade PS/2 30 286	128.00
6450372	2MB Memory Adapter 6450367	395.00
6450603	1MB SIMM PS/2 70-E61; 121	68.00
6450604	2MB SIMM PS/2 50Z-70	108.00
6450608	2MB SIMM PS/2 70 - A21	128.00
34F2933	4MB SIMM PS/2 55SX; 65SX	279.00
6450375	1MB Mem. BD PS/2 80-041	96.00
6450379	2MB Mem. BD PS/2 80 111-321	158.00
6451060	4MB Mem.BD PS/2 80-A21;A31	298.00
6450605	2-8MB Xpand Mem. PS/2 70&80 w/2MB	348.00
34F3077	2-14MB Xpand BD. PS/2 70&80 w/2MB	388.00
6450609	2-14MB Xpand BD. PS/2 50-65SX w/2MB	388.00

CALL FOR PS/1 MEMORY

AST MEMORY

CAT. #	DESCRIPTION	NSI
500510-001	512K Upgrd Kit Prem 286 FASTRAM	39.00
500510-002	2MB Upgrd Kit Prem WS 386SX; WS 286; Bravo 286 & 386SX; Rampage Plus 286; Advntg Prem &/2; Ram Advntg; Advantage	118.00
500510-003	1MB Upgrd Kit Premium 386	98.00
500510-004	4MB Upgrd Kit Prem 386; Rampage Plus/MC; Advntg 286 & 386	310.00
500510-007	1MB Upgrd Kit Prem 386C; 386/16	65.00
500510-008	4MB upgrd Kit Prem 386c; 386/16 Advanced FASTRAM; FASTboard 386	230.00
500510-010	512K Upgrd Kit Prem WS 386SX & WS 286; Bravo 286, Rampage + 286	39.00
500510-011	128K Upgrd Kit Bravo 286	40.00
500709-001	512K Upgrd Kit Advn /2; Rampage PC	40.00
500709-003	512K Upgrd Kit Rampage Plus/MC	40.00
500718-001	1MB Mod. Prem 386/25 & 386SX/16	65.00
500718-002	1MB Mod. Prem 386/33-25; SX/16; 486/33;25T; 25TE; 25; 25E; Adapter Board 500722-004	75.00
500718-004	2MB Upgrd Kit Prem 486 Series	186.00
500780-001	8MB Kit Prem 486 Series	870.00
500818-004	1-16MB Exp Bd Prem 386/25-33; Prem 486's	450.00
ASTSX20	1MB Mod Prem II 386SX/20	84.00

HP (CPU) MEMORY

Cat. #	DESCRIPTION	NSI
D1354A	2MB Up-Kit Vectra QS/16S &ES12 PC	114.00
D1640A	1MB Up-Kit VECTRA QS/20PC; RS25PC & 20C	62.00
D1642A	1MB Up-Kit VECTRA QS/20PC; RS25PC & 20C	234.00
D1540A	1MB Up-Kit VECTRA QS/16S	62.00
D1540A	1MB Up-Kit VECTRA QS/16S	62.00
D2150A	1MB Mod VECTRA 486 PC	78.00
D2151A	4MB Mod VECTRA 486 PC	282.00
D2152A	8MB Mod VECTRA 386/25;486PC	930.00
D2381A	2MB Mod VECTRA 386/25 PC	144.00

ZENITH MEMORY

CAT. #	DESCRIPTION	NSI
ZA180-64	2MB Card Super Sport SX; 286E	240.00
ZA180-66	1MB Card Super Sport 286; 286E	180.00
ZA180-86	2MB Card Super Sport SX (ALPHA)	240.00
ZA180-87	2MB Card Super Sport SX (BETA)	240.00
ZA3034ME	1MB Card Turbo Sport 386E	199.00
ZA3034ME2	4MB Card Turbo Sport 386E	590.00
ZA3034ME2	4MB Card Turbo Sport 386E	590.00
ZA3600ME	1MB Mod. Z-386/20-25-33-33E	79.00
ZA3600MG	2MG Mod. Z-386/20-25-33	130.00
ZA3800ME	1MB Mod. Z-386/20-25-33-33E	79.00
ZA3800MK	4MB Mod. Z-386/20-25-33-33E	268.00

TOSHIBA MEMORY

CAT. #	DESCRIPTION	NSI
PC6-PA7137U	3MB Mem Card Port. T3200	228.00
PC7-PA8301U	2MB Mem Card Port. T5100	168.00
PC8-PA8302U	2MB MemCard Port. T1600	162.00
PC9-PA8340U	512K Mem Card Port. T3100E	120.00
PC9-PA8341U	2MB Mem Card Port. T3100E	168.00
PC10-PA8304U	2MB Mem Card Port. T5200 Toshiba Destop T8500	168.00
PC12-PA8307U	2MB Mem Card Port. T3200SX	168.00
PC12-PA8309U	4MB Mem. Card Port. T3200SX	389.00
PC14-PA8306U	2MB Mem Card Port. T1200XE	168.00
PC14-PA8311U	1MB Mem Card Port. T1000SE; T1000XE	218.00
PC14-PA8312U	2MB Mem Card Port. T1000SE; T1000XE	276.00
PC15-PA8308U	2MB Mem Card Port. T3100SX	162.00

NEC MEMORY

Cat. #	DESCRIPTION	NSI
APCH655X	2MB Mod Powermate 386/25	458.00
APCH656X	8MB Expansion Bd. Powermate 386/25	1,190.00
APCH657X	3MB Base Bd. Powermate 386/25	1,250.00
APCH850E	1MB Expansion Bd. Powermate SX Plus	240.00
APCH852E	4MB Expansion Bd. Powermate SX Plus	690.00
PC21-21	1MB CD ProSpeed 286;386SX	245.00
PC21-22	4MB CD ProSpeed 286;386SX	569.00
PC21-26	2MB CD ProSpeed 286;386SX	309.00
PC31-21	2MB CD ProSpeed 386	319.00
PC31-22	8MB CD ProSpeed 386	1,190.00
KTN2000/SX	2MB Exp. Bd. Powermate SX Plus	440.00
KTN8000/SX	8MB Exp. Bd. Powermate SX Plus	1,190.00

LASER PRINTER MEMORY

Cat. #		WORKS WITH	NSI
H33474B	1MB	HPLaser Jet IIP,III, IIID	99.95
H33475B	2MB	HPLaser Jet IIP,III, IIID	139.95
H33477B	4MB	HPLaser Jet IIP,III, IIID	214.95
H33443B	1MB	HPLaser Jet II & IID	99.95
H33444B	2MB	HPLaser Jet II & IID	139.95
H33445B	4MB	HPLaser Jet II & IID	214.95
EP1000	1MB	Epson EPL-6000	129.00
EP2000	2MB	Epson EPL-6000	169.00
EP4000	4MB	Epson EPL-6000	249.00
T11000	1MB	Texas Instrument MicroLaser PS	129.00
TB1000	1MB	Toshiba Page Laser 6	118.00
TB2000	2MB	Toshiba Page Laser 6	164.00
TB3000	3MB	Toshiba Page Laser 6	208.00
TB4000	4MB	Toshiba Page Laser 6	248.00
1039136	1MB	IBM Laser 4019;4019E	129.00
1039137	2MB	IBM Laser 4019;14019E	169.00
1038675	3.5MB	IBM Laser 4019;4019E	229.00
M6005	1MB	Apple LaserWriter II/NTX	85.00
M6006	4MB	Apple LaserWriter II/NTX	319.00
S63-1300	1MB	Canon LBP-8II	119.00
S63-1880	2MB	Canon LBP-8II	189.00
N/A	4MB	Canon LBP-8II	269.00
PA1000	1MB	Panasonic KXP4420; KXP4450i	118.00
PA2000	2MB	Panasonic KXP4420; KXP4450i	164.00
PA3000	3MB	Panasonic KXP4420; KXP4450i	208.00
PA4000	4MB	Panasonic KXP4420;	248.00

SIMM MODULES

	150	120	100	80	70	60
256x8	15.00	17.00	19.00	22.00		
256x9	17.00	19.00	21.00	24.00		
1MBx8			50.50	51.00	60.00	65.00
1MBx9			53.50	54.95	65.00	68.00
4MBx8				224.00	234.00	274.00
4MBx9				234.00	244.00	284.00

COMPAQ MEMORY

CAT. #	DESCRIPTION	NSI
107331-001	512KB Upgrade Portable III	38.00
107332-001	2MB Upgrade Portable III	118.00
107651-001	1MB Module Portable 386	218.00
107653-001	4MB Xpand Mem. Portable 386	630.00
107654-001	4MB Mem. Xtension Portable 386	630.00
108069-001	1MB Xpand Memory DP386-16	288.00
108070-001	4MB Xpand Memory DP386-16	630.00
108071-001	1MB Memory Upgrade DP386-16	108.00
108072-001	4MB Memory Upgrade DP386-16	438.00
110235-001	1MB Memory BD Slt 286	162.00
110237-001	4MB Memory BD Slt 286	630.00
112534-001	4MB Module DP386S-16	298.00
113131-001	1MB Module DP386286E, 386 20-25E	96.00
113132-001	4MB Module DP2886E, 386 20-25E	228.00
113633-001	1MB Xpand Mem. DP386S-16	148.00
113634-001	4MB Xpand Mem. DP386S-16	358.00
113644-001	1MB Xpand Mem. DP386 20E, 25E	148.00
113645-001	4MB Xpand Mem. DP386 20E, 25E	358.00
113646-001	1MB Module DP386S-16	110.00
115144-001	1MB Module DP386-33, 486-25, Syspro	158.00
116561-001	8MB Module 486-25, Syspro	899.00
116568-001	32MB Module DP486-25, Syspro	4,990.00
117077-001	512KB Mem. BD Portable LTE	119.00
117081-001	1MB Mem. BD Portable LTE 286	99.00
117081-002	2MB Memory BD Portable LTE 286	158.00
118304-001	1MB Module for SLT/386	174.00
118304-001	2MB Module for SLT/386	270.00
118305-001	4MB Module for SLT/386	630.00
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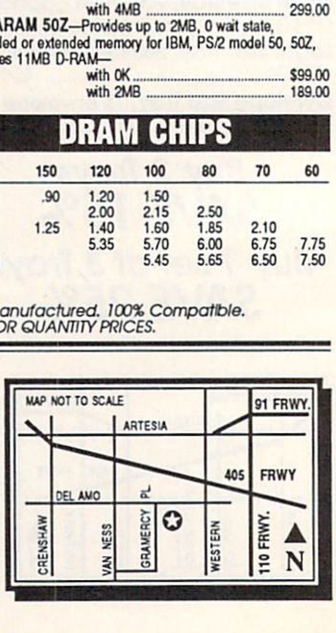

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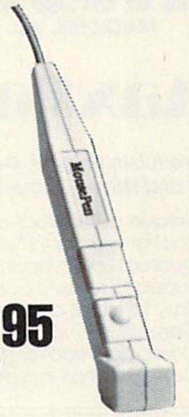

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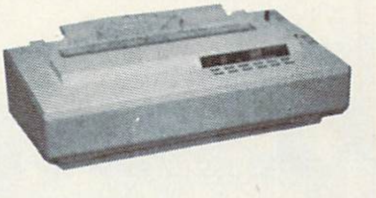

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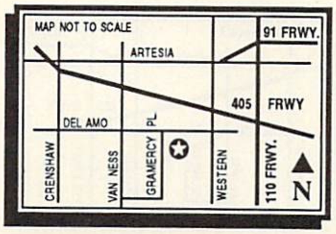

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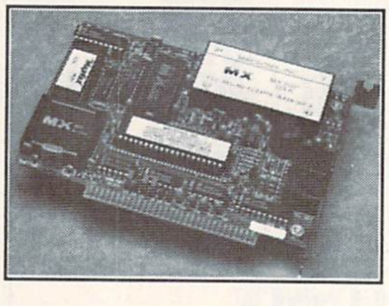

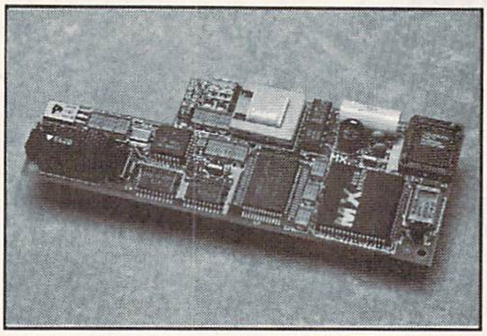

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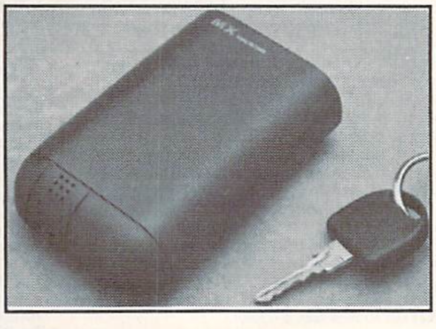

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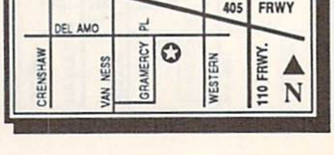


PATHWAYS

Steven Anzovin

CYBERWOCKY

'Twas brillig, and the slithy toves
Did gyre and gimble in the wabe;
All mimsy were the borogoves
And the mome raths outgrabe.

Those lines from Lewis Carroll's "Jabberwocky" may not sound like the future of computing to you, but if you listen closely, you can hear them in all the talk about VR (Virtual Reality), perhaps the ultimate computer buzzconcept.

The whole idea of VR, which we'll define here as "a computer-generated simulation of real experience," has given birth to a staggering amount of verbal goulash, much of which makes "Jabberwocky" sound sensible.

Virtual reality, artificial reality, synthetic reality, cyberspace, cyberarts, multimedia, hypermedia, or whatever it is—you know there's some basic confusion here when the experts can't agree on what to call it—is hot stuff right now.

It's attracting plenty of press, including this magazine, and the attention of some big players in the industry—Autodesk, Apple, IBM, Microsoft, VPL Research, Evans & Sutherland, and many more. But since researchers really don't know what they're doing yet, VR stuff tends to stay in the labs. In fact, most of it's just theorizing—virtual VR, so to speak.

Not much VR has filtered down to the real-world level—a few pieces of hardware, like the Gold Brick for the Mac, and some innovative software like *Vista* for the Amiga. You have to look in the journals and attend the conferences to get a real sense of where VR research is headed.

Writing in last year's summer issue of *Multimedia Review*, Randal Walser, manager of the Autodesk Cyberspace project, outlined a VR world system that involves a puppet (a virtual actor in the virtual world) controlled by a patron (a real person in the real world). This puppetmaster paradigm leaves me cold—too schizophrenic. Remember the "Twilight Zone" episode in which the evil dummy takes over the ventriloquist?

I go for the virtual telepresence model espoused by Scott Fisher, formerly of the NASA Ames Research Center. In this concept you can take on an entirely different identity (someone rich and famous, for example) and interact with others in their virtual identities. In other words, instead of just watching "Star Trek," you can be in it. As you can see, conceptualizing about VR is still at the infotainment level.

Some thinkers warn us to ground our virtual realities in some aspect of true reality, lest we lose our way in them. (Maybe it's the VR theorists who have lost touch with reality.) While moral and ethical questions don't come up often in mainstream VR research, VR does have its own Moses.

At the last Virtual Reality Conference held in San Francisco in December 1990, Professor Michael Benedikt of the University of Texas brought down from the mountain seven commandments for the design of virtual realities, including:

- The world is indifferent to the user.
- One may not enter a space invisibly.
- Shared spaces exist by the consensus of those sharing them.

It seems that Benedikt's main concern is to prevent cyberspatial voyeurism. That takes all the fun out of it for me, but my personal favorite is, "Each world contains fewer dimensions than itself." Think about that for a minute.

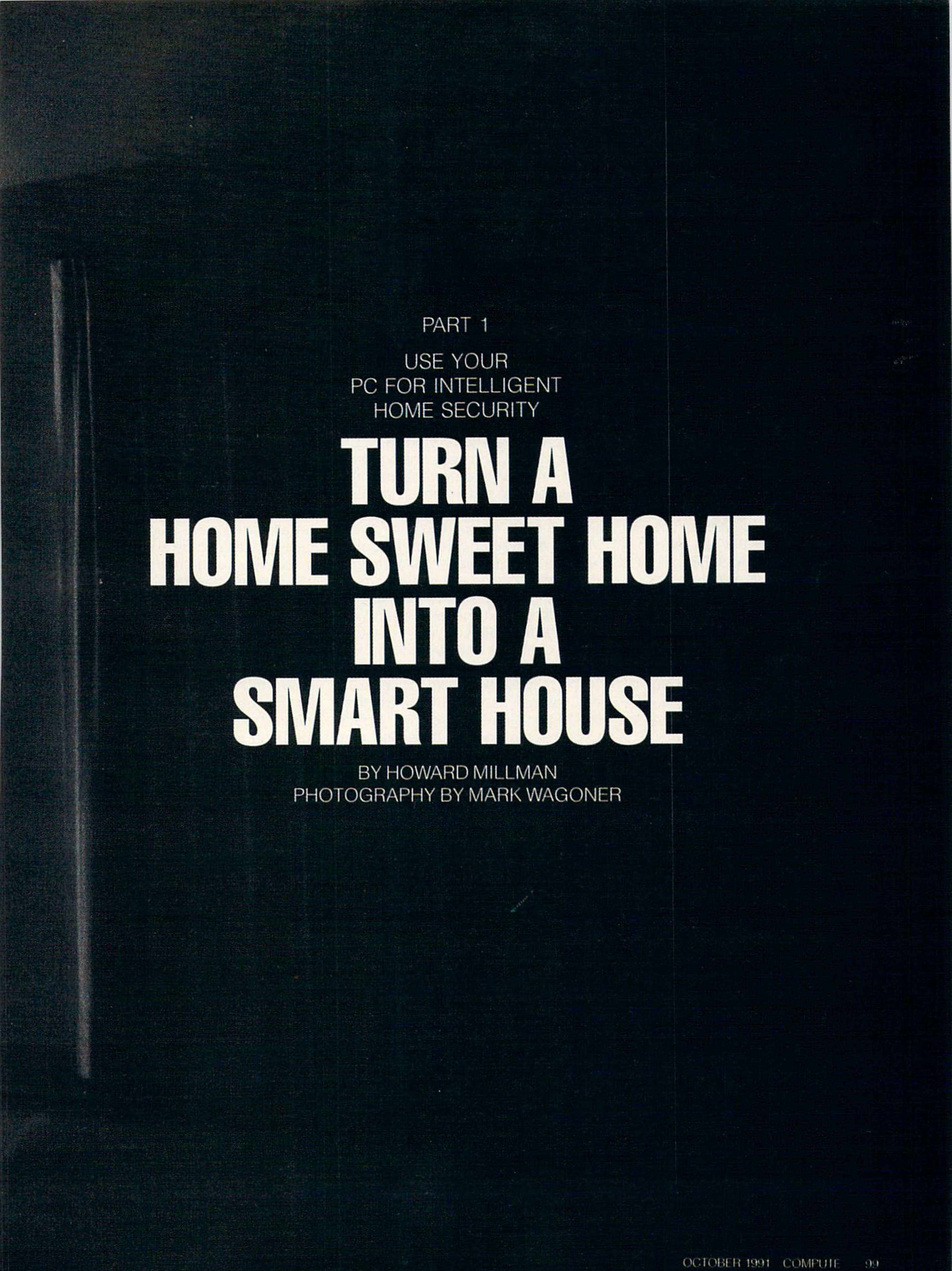
The academic approach to VR, however, is not for everyone. The really interesting action is elsewhere. For a look at the outlaw fringe of VR—as well as other bizarre manifestations of the electronic age—check out *Mondo 2000* magazine (P.O. Box 10171, Berkeley, California 94709).

What makes us think the virtual worlds we create will be any better than the real thing?

Self-described as a "mutazine" for cyberpunks, hackers, crackers, and wild-eyed visionaries, *Mondo 2000* is kind of a blend of *Interview, Mother Jones, Shaman's Drum,* and *New Media Age*. It covers everything from weird electronic conspiracies—if you believe the letters to the editor, there are a lot of them out there—to the latest trends in drug-free expansion of the senses.

The race for VR (as *Mondo 2000* likes to call it) is fascinating to follow, and the VR toys are fun to play with, but you really have to wonder, why are we so anxious to escape into alternate realities? And given the state of the real world, what makes us think the virtual worlds we create will be any better than the real thing?

Such questions make me a bit anxious about the "frabjous day" when VR is—you'll excuse me—a reality. ❒



PART 1

USE YOUR
PC FOR INTELLIGENT
HOME SECURITY

TURN A HOME SWEET HOME INTO A SMART HOUSE

BY HOWARD MILLMAN
PHOTOGRAPHY BY MARK WAGONER

Want to make a computer happy? Give it something to do over and over again. Let it check a window several times a second to see if it's been forced open, or take indoor and outdoor temperatures and constantly adjust the heat accordingly, or "look" to see if someone's entered a room and then turn on the lights if it's after 7:00 p.m. These are typical activities in a computer-controlled Smart House.

In 1984, the National Association of Home Builders (NAHB), who coined the term *Smart House,* developed the idea of a computer-controlled home—whether a house, condominium, or apartment—that would allow owners to spend more time pursuing life's rewards and less time performing routine household tasks. The result of that idea is a 40-million-dollar prototype the NAHB hopes will evolve into an industry standard.

In the meantime, the Electronic Industries Association (EIA) is already promoting a competing standard: the Consumer Electronics Bus, or *CEBus*. The primary difference between NAHB's Smart House and EIA's CEBus is that the Smart House uses a central computer, while the CEBus requires individual devices to have on-board intelligence and computers to exchange data with each other through a common language. Generally, the NAHB standard appears well suited to control equipment and processes while the CEBus delivers greater versatility in controlling appliances.

In addition to NAHB and CEBus, existing standards such as X-10 are also clamoring for a piece of this quickly expanding market. X-10 devices are popular because they use the home's existing electrical wiring to carry a superimposed signal that controls lights and appliances. However, a major problem with X-10 is that because they're line-carrier devices, line voltage electrical noise sometimes falsely triggers wired-in appliances.

A Low-Cost, High-IQ Security System

The computer-in-residence system designed by *COMPUTE* uses a central computer for two reasons: It involves a lower initial cost, and it's easier to retrofit into an existing building, which makes it a good system to use as a model for your own smart house.

COMPUTE's system consists of four elements: sensors to sample physical events such as temperature, light, sound, motion, and heat; analog/digital cards to convert data received from the sensors into digital form so the computer can understand it; a personal computer with compatible control software to analyze and act on the data it receives; and a series of relays to control different pieces of equipment, processes, and appliances. Since many data-acquisition and control (DA&C) functions are time based, your computer should contain a battery-backed clock and calendar.

This may all sound expensive, but in fact, you can assemble it for less than $600 if you already have a PC. In fact, if you have an old XT collecting dust in the closet, that's the one you should use. Control software that operates the security system is written in BASIC and will run under BASICA or GW-BASIC on essentially any PC, including older ones (see Programming Your Smart House below).

The first task you'll want to assign your computer is providing perimeter security. According to a recent U.S. Justice Department survey, burglaries are four times more likely to occur in homes without intrusion alarms. In addition to your improved peace of mind and the property protection, an added bonus to having a system is that some insurance companies provide premium reductions for homes protected by security systems. Be sure to check with your insurance company to find out if you're eligible for such a premium. You may want to switch carriers if not.

At some time or another, most any alarm system is going to inconvenience you—and your neighbors—to some degree, usually in the form of nuisance alarms. A major reason for nuisance alarms is dumb alarm systems that "think" every occurrence warrants an all-hands alert. Such systems are usually activated by a solitary event.

Conversely, a smart alarm system will compare data received from its different sources to determine if a verifiable alarm condition exists. The system we've designed here employs two sensor circuits. Circuit 3 on the analog/digital board you'll use monitors windows and doors with magnetic contacts; circuit 4 uses a low-cost passive infrared detector. When the two data-reporting sources independently confirm activity, the alarm will sound.

While you'll design in some safeguards, you should also recognize that excessive caution is undesirable. Too many precautions mean an overencumbered alarm system may not operate when it should.

BASE SYSTEM SUPPLIES

Alpha RE-140 eight-relay output card	$142
Alpha AD-142 eight-channel analog/digital input card	$142
Alpha AR-133 PC bus adapter	$ 69
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Alpha PS-126 12-V power supply	$ 12

Alpha offers a special package for $379 that includes these components as well as its CD-113 light sensor and TS-111 temperature sensor, which you'll learn about in January's *COMPUTE*.

ALARM SYSTEM SUPPLIES

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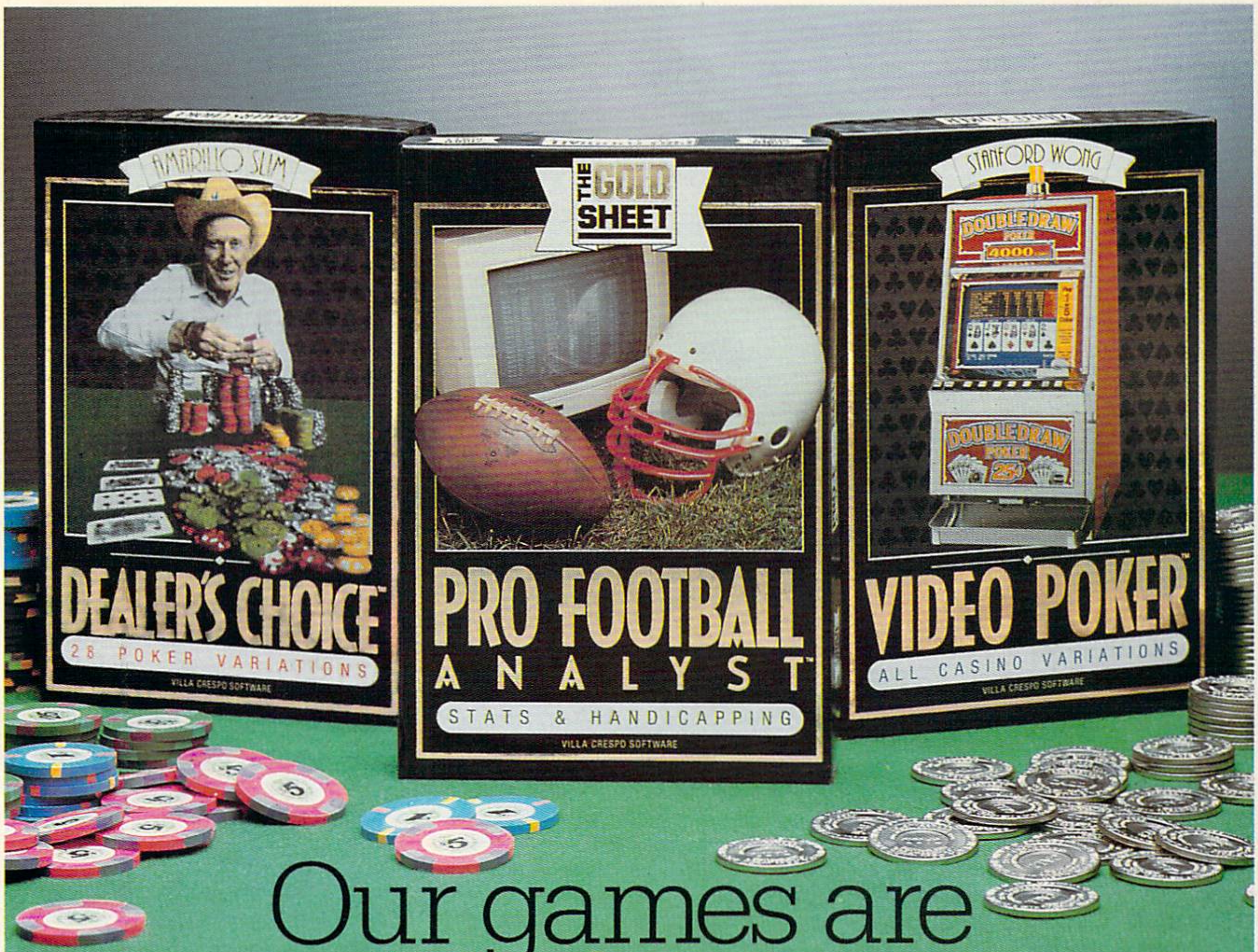
PLEASE NOTE: THE FOLLOWING SECTION INVOLVES WIRING YOUR SYSTEM TO DANGEROUS HOUSEHOLD ELECTRICAL CIRCUITS. UNLESS YOU ARE EXPERIENCED WITH HOUSE-HOLD CIRCUITS, LEAVE ALL HIGH-VOLTAGE WIRING TO A LICENSED PROFESSIONAL.

Installing the Smart Security System

The first step of installing the system is to define the areas of your home you want to include. Depending on the number and type of sensors you choose, the cost of your alarm system components should only total between $20 and $150.

Your computer's interface will remain the same for all installations. Alpha Products' DA&C cards are recom-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Villa Crespo
SOFTWARE

HOMEBOT

Samsung's SCOUT-ABOUT may not be R2D2, but it's the closest thing yet to a personal droid—particularly if you're looking for a convenient way to guard your home and, according to its makers, if you're on a budget. The robot will sell for less than $1,000 when it arrives in stores and catalogs next February.

The SCOUT-ABOUT is what Samsung calls a home service robot, but its main function is to guard your personal property. It will roam any area of your home for up to 50 hours at a time, making its way around objects over two inches high, stopping to check out the conditions of the area it patrols. Using a dual-detection ultrasonic and passive infrared sensory system, the SCOUT-ABOUT alerts an automatic digital dialer by way of radio signals if it detects body heat, motion, a consistent change in air temperature, or shattering glass.

If it isn't convenient for the robot to roam, you can plug it into a wall socket where it acts as a stationary monitor. Running on batteries alone, it will monitor from an idle position for about 70 hours before needing a recharge.

The robot is perfect for apartments, condominiums, vacation homes, small businesses, or any other place needing effective intruder security that's simple to implement. And at under 16 pounds, it's portable enough to use in automobiles, boats, and campers.

Since SCOUT-ABOUT is equipped with a radio transmitter, it can act as a one-way monitor for the baby's room, allowing you to hear everything within 150 feet of the robot. The SCOUT-ABOUT package also includes a medical alert pendant with a button that directly activates the autodialer. So if you've fallen and can't get up, the SCOUT-ABOUT may not come to your rescue, but the autodialer will.

SCOUT-ABOUT

For $1,000, you can assemble a much more elaborate security system than the SCOUT-ABOUT—one that monitors your entire house. Robots won't roam your house, but you'll be secure.

—JILL CHAMPION

mended for their excellent quality, ease of use, availability, and competitive prices, and because Alpha's control software, *SMART1,* is included free of charge with orders. However, you should certainly feel free to shop around for what you consider the best components and prices.

One recommended card is Alpha's AR-133 PC bus adapter, which plugs into any available 8- or 16-bit expansion slot of a PC. Also, Alpha makes a CA-162 ribbon cable, which contains two connectors that accept the RE-140 eight-relay output card and the AD-142 eight-channel analog/digital input card, which you'll use.

Circuit 3 on the Alpha AD-142 uses magnetic contacts to detect open doors and windows. For surface-mount contacts, Radio Shack's 49-495 surface-mount magnetic contact works well. For concealed mounting, use Radio Shack's model 49-496 contact. Although circuit 3 appears to have only two sensors, it will accommodate many more, including a glass-break sensor such as Radio Shack's model 49-521. Circuit 4 uses a passive infrared detector, such as Radio Shack's model 49-531, to confirm an intruder's entry.

Install the sensors in series so that power flows through each one. Since this is normally a closed system, an alarm condition exists if any one sensor "opens." You can install multiple detectors (in the same or different areas) by wiring them into a series circuit.

The RE-140 card, mentioned earlier, governs the output—flashing lights and a siren. Wire the flashing-light circuit to 120-volt output 0 on the RE-140 card.

Connect the siren to low-voltage output 7 on the RE-140. For the external siren alarm, use Radio Shack's 12-volt model 49-488 or an equivalent model.

Wires for low voltage (outputs 4, 5, and 6) on the RE-140 can be 24 gauge. Use a minimum three-pair cable to allow for future expansion and spares. Wiring between the 120-volt outputs to the light or lights must be at least 16 gauge and rated for 120-volt service. Be sure to install a snubber circuit here, or make sure your electrician installs it, to protect the relay's points against arcing and to protect the computer against stray signals.

Programming Your Smart House

You must have the right software to operate any computer-based security system. You can order a free copy of Alpha's GW-BASIC control software, *SMART1,* when you buy Alpha components. Data Systems Services also offers an easy-to-use, menu-driven BASIC program for $134. Both companies are listed in the product information box at the end of this article.

Your basic security alarm system should now be complete. That's all there is to it. In January's issue of *COMPUTE,* you'll learn how to expand the base system you just set up to include two more elements of intelligent home security—temperature control and lighting management.

Your March issue of *COMPUTE* will conclude the smart house series. There, you'll learn about sophisticated applications that range from using remote control to operate your appliances by telephone to transmitting realtime still video images over ordinary telephone lines to using infrared as well as direct-voice command of your computer's control programming. ❐

This computer-in-residence system is designed to be installed by you. If you're not familiar with 120-volt circuits, or if your local building codes prevent you from installing line-voltage wiring, have a licensed contractor install the wiring to the lights.

PRODUCT INFORMATION

For more information about buying security-system components and control software, contact the following companies. Radio Shack products can be purchased through a local Radio Shack store.

Alpha Products
303 Linwood Ave.
Fairfield, CT 06430
(800) 221-0916
(203) 259-8813

B&B Electronics
4000 Baker Rd.
Ottawa, IL 61350
(815) 434-0846

Data System Services
38 Amber Dr.
Croton, NY 10520
(914) 271-6883

Electronic Energy Control
380 S. Fifth St.
Columbus, OH 43215
(800) 842-7714

Real Time Devices
820 N. University Dr.
P.O. Box 906
State College, PA 16804
(814) 234-8087

You're encouraged to request home automation catalogs from the following companies, which carry a fascinating assortment of equipment and devices to control practically every appliance and process in your home.

Heath Company
P.O. Box 1288
Harbor, MI 49023
(800) 444-3284

Home Automation Laboratories
5500 Highlands Pkwy., Ste. 450
Atlanta, GA 30082
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Irvine, CA 92714 1(800)VRG-INO7

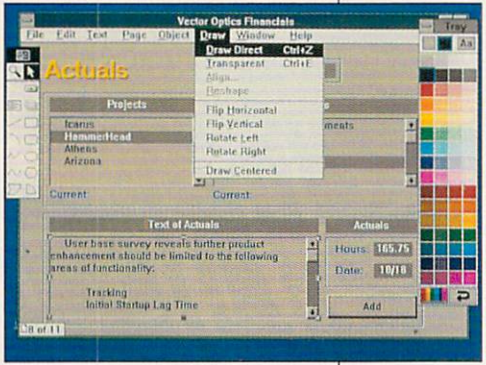
Circle Reader Service Number 105

FAST FORWARD

David English

WE'RE OFF TO SEE THE WIZARD

They call it Hot 'Lanta. It's the home of Ted Turner, a movie theater that only runs *Gone with the Wind,* and Spring COMDEX, the massive computer trade show. In past years, COMDEX has been a hardware show, but this year the organizers added WINDOWS WORLD, a *Windows* show-within-a-show. Guess where the biggest crowds were. That's right—most of the attendees spent most of their time checking out the latest offerings in *Windows* programs.



User base survey reveals further product enhancement should be limited to the following areas of functionality:

Tracking
Initial Startup Lag Time

Hours: 165.75
Date: 10/18

Asymetrix's ToolBook 1.5 was just one of the new multimedia products shown at COMDEX.

Within WINDOWS WORLD, you could find a section devoted to *Windows*-based multimedia products (sort of a show-within-a-show-within-a-show). Microsoft was touting the imminent release of *Microsoft Windows graphical environment* 3.0 + *Multimedia Extensions* 1.0. That's the official name for what Microsoft used to call *Multimedia Windows.* It's a name only a lawyer could love and journalists and computer users will quickly come to hate. According to Microsoft, the official informal name is *Windows with Multimedia.*

Whatever you call it, it should be available by the time you read this, either in the form of new PCs (officially called Multimedia PCs) or upgrade kits (called, oddly enough, Upgrade Kits). If you choose the upgrade path, you'll generally get the *Windows* multimedia extensions, a CD-ROM player, and a sound card.

Not surprisingly, the two biggest PC manufacturers were busy showing off their soon-to-be-released Multimedia PCs and Upgrade Kits. IBM is offering two Upgrade Kits that can transform a PS/2 into either a Training System or an Information Delivery System (more product names for lawyers). A Training System is a 386-based PS/2 that includes a VGA monitor, a laser disc player, and IBM's M-Motion sound card, as well as support for touch input. An Information Delivery System is a 286-based PS/2 with VGA graphics, a CD-ROM, and an 8-bit sound card.

Tandy, the other big PC manufacturer, announced three Multimedia PCs—a 16-MHz 80286, a 20-MHz 80386SX, and a 16-MHz 80386DX. All three include an internal CD-ROM drive, Tandy's multimedia sound board (with full MIDI support and Sound Blaster compatibility), and a VGA Plus video card and monitor (for a resolution of 640 × 480 with 256 colors). Tandy's Upgrade Kits include *Windows with Multimedia,* a CD-ROM drive, and Tandy's multimedia sound board. The kits sell for $799.95 (with an internal CD-ROM drive) and $899.95 (with an external CD-ROM drive). By the way, Tandy's new internal CD-ROM drive is a real bargain at $399.95, and it fully meets the Microsoft multimedia specifications.

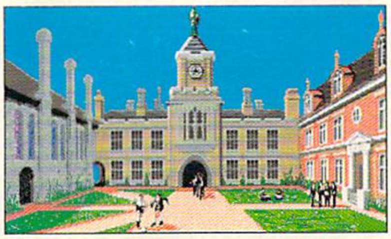
Turtle Beach Systems showed its new 16-bit sound card, called MultiSound, which provides CD-quality sound for $995. With a top-selling Proteus synthesizer built into the card, this represents a truly significant price breakthrough for adding professional-quality sound to *Windows* applications.

In software, Passport Designs announced that its latest version of *Master Tracks Pro* ($395.00) supports *Windows with Multimedia.* It's currently the top *Windows*-based MIDI-sequencer program, but expect one of the major Macintosh MIDI-software developers to announce a competing *Windows* product real soon now. Brown-Waugh showed its new *Cyber Animator* ($199.95), a low-cost *Autodesk Animator* competitor that can read *Animator* FLI files. You can have individual animation frames trigger sound effects that play through a Sound Blaster.

Asymetrix demonstrated a faster version of *ToolBook* (version 1.5, $395). It displays objects on the screen 30–40 percent faster than before. A special multimedia version of *ToolBook* should be available by the time you read this. And U-Lead wowed the crowd with its new *PhotoStyler* ($795), a slick new image-processing program that's similar to *Adobe Photoshop* and *ColorStudio* on the Macintosh. It's the first serious 24-bit-color photo-editing program for the PC. More are on the way.

The rest of the new multimedia hardware and software will have to wait for future columns. Spring COMDEX proved that multimedia isn't all smoke and mirrors. These are real products that can turn frustrated nonprogrammers (or tinkering weekend programmers) into professional-level multimedia wizards. ❐

MORE BABES. MORE BREWSKIS. MORE BAD JOKES.



Ah, college life! Tree-lined walks. Hushed study halls. Ivy-covered professors. The days are filled with the quiet pursuit of knowledge. The nights, however, are a different story!

ERNIE IS BACK!

Welcome to *Spellcasting 201: The Sorcerer's Appliance.* Ernie Eaglebeak is back at Sorcerer University for his sophomore year and he wants to join a fraternity. No problem, except for those quaint, harmless initiation rituals known collectively as... HELL WEEK!

RETURN TO ANIMAL HOUSE

Every night, in a mysterious chamber below the fraternity house, a vindictive pledgemaster dons a ceremonial chicken suit and burdens Ernie with a series of ridiculously impossible hazing tasks. Fortunately, Ernie knows where to get help. He creates it!

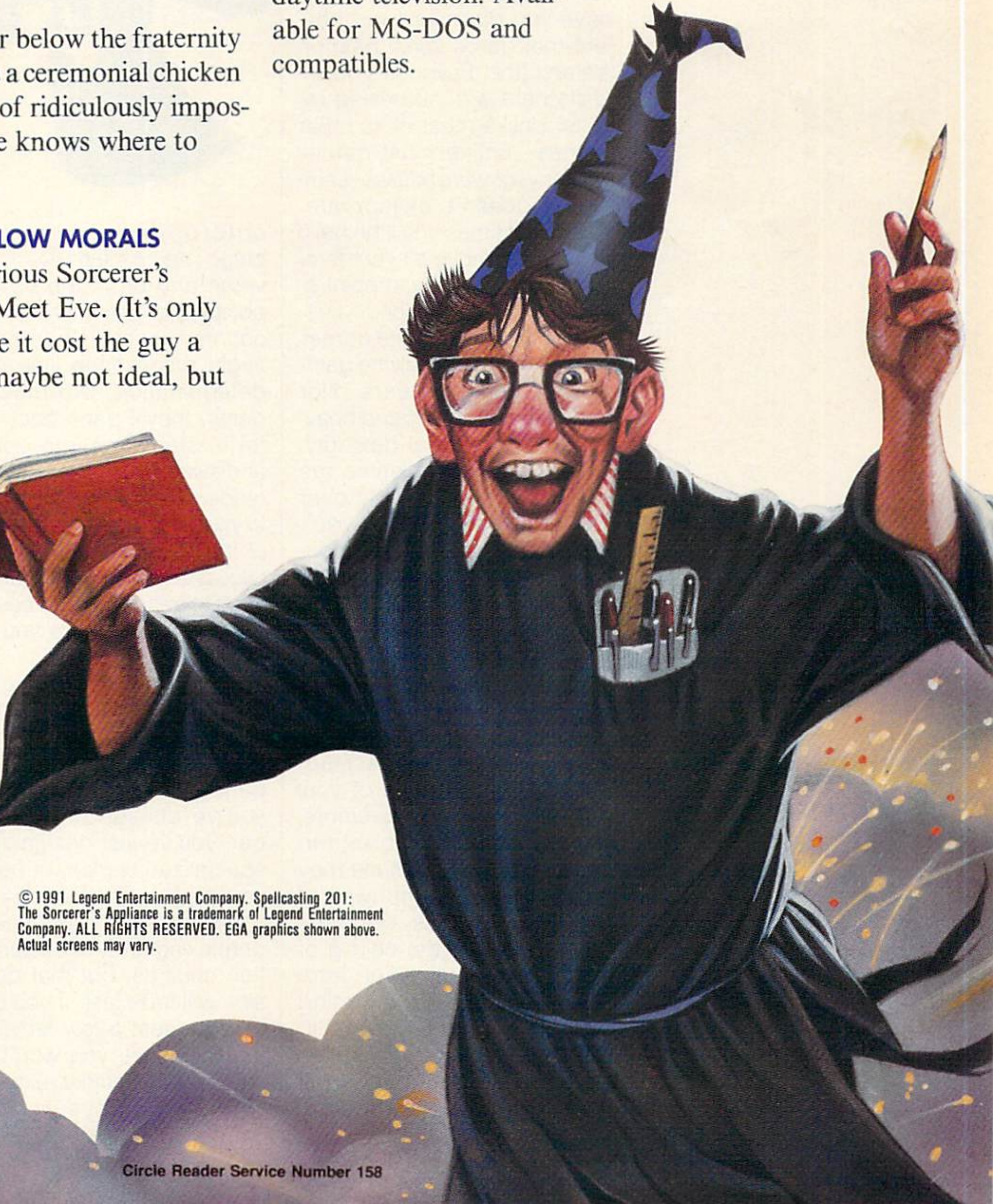
A TALE OF HIGH EDUCATION AND LOW MORALS

Harnessing the powers of the mysterious Sorcerer's Appliance, Ernie creates a woman. Meet Eve. (It's only been done once before, and that time it cost the guy a rib). Eve is the ideal woman. Well, maybe not ideal, but certainly entertaining.

WE HOPE YOU'VE DONE YOUR HOMEWORK

Join Ernie and Eve in this hilarious romp through the bedrooms, turrets, and tunnels of both Sorcerer University and nearby Barmaid U (where grading on a curve takes on a whole new meaning). To pass this course you'll need to cast ridiculous spells, solve ribald puzzles and "interact" with gorgeous women. Any questions? We didn't think so. Class dismissed.

From the scandalous imagination of Steve Meretzky, *Spellcasting 201* is the sequel to his award-winning hit, *Spellcasting 101: Sorcerers Get All The Girls.* These games may be considered unsuitable for young minds, as they contain material and situations that children have already seen in far greater detail on daytime television. Available for MS-DOS and compatibles.



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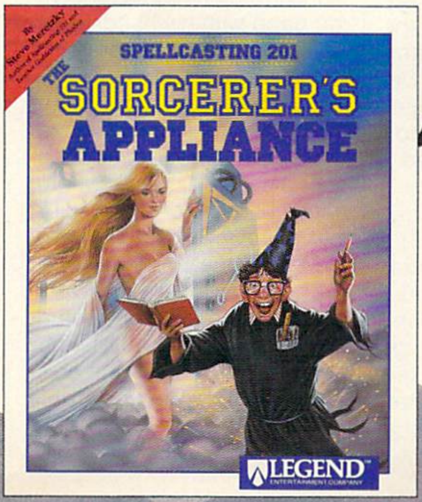

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Circle Reader Service Number 158

ENTERTAINMENT

COMPUTE CHOICE. Ride herd over a passel of adorable—but shortsighted—rodents in this subterranean diversion.

David Sears

Lemmings
Lemmings

LEMMINGS

I feel driven to play *Lemmings,* and it's not just for the entertainment value. Perhaps Psygnosis has tapped into the human instinct for survival in formulating this perfect blend of puzzle, strategy, and action.

Better known for its less sedate titles that have you blasting every object that dares scroll past on a starscape, Psygnosis downshifts here with surprising results. Unlike most of its other games—unlike most games from any software house—*Lemmings* doesn't exasperate. Though at times you'll be hard pressed to move all your lemmings from point *a* to point *b,* you'll sense a solution to every level just around the corner, no matter how difficult the gamut of pitfalls appears. Nor does *Lemmings* depend heavily on your manual dexterity. Don't expect to mistime the same segment of play over and over again. Sure, you'll plummet to your death a couple of times, but you'll do better. Your onscreen brothers depend on you.

As the primary controller for all the characters in *Lemmings,* you not only must plan a mass exodus from each perilous level but also must learn the personality traits of your charges. First and foremost, your cartoonish brethren need guidance because they possess the brainpower of common hamsters. Once the hatch opens in the ceiling of each cavernous level, lemmings drop at an alarming rate. They amble forward in their baggy tunics, little green tufts of hair bouncing, until they smack into a wall or rocky outcropping. Then it's full reverse and off in the opposite direction until they encounter a similar barrier. We might respect the little guys' determination; like most rodents, they'll pace back and forth, slamming into objects and swarming in a manner that renders them all but impervious to your selection and guidance of individual lemmings. If you have a task for a particular lemming to perform, you'd best assign the duty before you lose him in the crowd.

To provoke a lemming to a specific action, position the crosshairs over the standard-issue lemming and click. Depending on which attributes you've chosen on the icon bar, you've just designated a specialized worker, or hero, if you prefer. On the icon bar, you'll find what might seem a perplexing array of customization choices, but that confusion will fade fast. If you don't alter at least a few lemmings in each level, you won't see much of the quirky, exhilarating, and torturous world that lemmings populate. Of course, they don't experience the apprehension of future levels as much as you might, since they see only the walls in front of them.

Often you'll want to send a scout ahead to pave the way for the masses and to reveal the traps. To do this, let the first lemming out of the gate pass; then change the next lemming to a Blocker. He'll stand in the path of the oncoming gang with his hands up in defiance. The others will bump into him and rebound toward the gate. You might need to plant another Blocker to stem the tide in that direction; pitfalls exist everywhere, and your entire crew could fall into a crevice, lost forever.

Meanwhile, your intrepid explorer may encounter a vertical cliff, a column, or another sheer surface. Select the Climber icon and transfer that ability to the explorer, and he'll clamber straight up. Should he face a fatal drop on the other side of the mountain, activate the Floater icon and transfer that safety feature to your trailblazer, and no matter how far the drop, he'll parachute serenely down thanks to a trusty umbrella. Unlike most of the attributes you can imbue, Climbing and Floating have staying power. Until the lemming gifted with either or both of those powers dies or reaches the next level, he will retain those abilities.

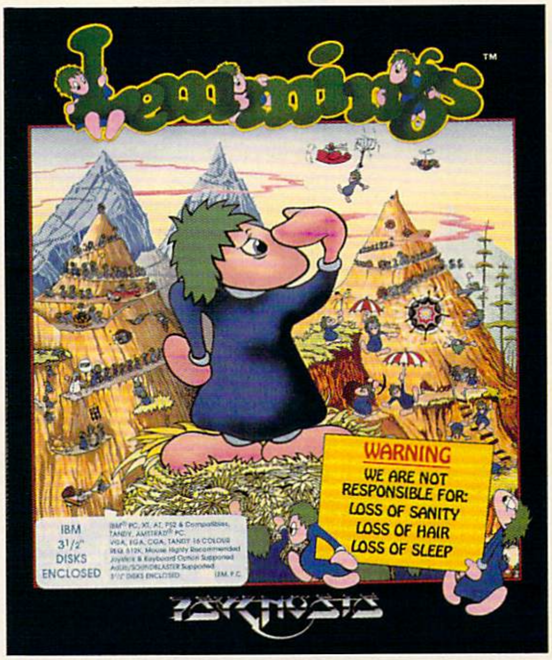
When your front runner clears the first mountain only to be stopped by a lava flow, do you worry? No, just add Builder to his list of talents, and he'll construct a bridge that will support any amount of pedestrian traffic. You can't use bridges for everything, though. Sometimes you'll have to tunnel horizontally, vertically, or diagonally through a piece of rock or other substance. *Lemmings* supplies you with suitable iconic options for surmounting these obstructions—Basher, Digger, and Miner, respectively. When excavating drones run out of material to displace, they revert to type and won't dig again unless you reassign them special abilities.

With diligence, you'll guide the first of your lemmings out of the worst culs-de-sac and to the egress. There, he'll happily bail out of the cavern, showing you the bottoms of his feet as he crawls up and over to safety. But what about the others? Up to 99 lemmings might have been involved in this subterranean peregrination, and we've left them back at the entrance, bouncing off the walls and one stolid Blocker. Here *Lemmings* teaches the art of sacrifice. To finish the level, that Blocker—the one who's done such a commendable job deferring his brothers' date with destiny—well, he'll have to die. Choose Bomb and click on your poor, dutiful Blocker. A five-second countdown display begins over his head and stays there until the fateful explosion occurs.

Don't expect remorse or gratitude from the rest of the group. For them, the Blocker just delayed progress. With their mindless intent to go places, the surviving lemmings will troop over the crater left by their defunct comrade, through tunnels excavated by their long-gone nameless kin, and over bridges erected especially for them. Rather like a civil servant, no lemming should expect thanks for a job well done; neither should you.

Your reward for completing a level and orchestrating the actions of so many myopic, disaffected jokers is a password; with it you can return to this point in the game without performing any sort of disk-based save-game procedure. You also merit the intense satisfaction that comes from surviving—even vicariously—the worst the world (or game designers) can throw at you.

You'll have to play *Lemmings* for the PC solo. The design team left behind the two-player version offered for other machines. Don't fret over that loss too much; the two-player game might seem more entertaining at first because players can cooperate, but soon enough, they'll start killing off each other's lemmings just because they can. Playing *Lemmings* on your own should provide adequate challenge and allow you to focus on the real object of the game—saving as many lemmings as possible.



Though not the most graphically detailed creatures, lemmings animate flawlessly, and when they combust, explode, drown, or grind themselves into hamburger, you'll be quite aware of what they go through. With a sound card, *Lemmings* supplies a satisfactory array of thuds and chirps and—while not traditional Psygnosis disco by any stretch—a charming soundtrack.

Squint at *Lemmings*, and you'll see a number of metaphors ideal for mention in the conversational circles of the sociologically minded. Draw comparisons between *Lemmings* and the me-first, me-now generation; your friends who never play computer games will marvel at your insight and wonder if they shouldn't buy a machine of their own. Mention the fun, too, of course—that sells more games than any amount of political correctness. ❐

IBM PC and compatibles, 512K RAM, CGA, EGA, VGA, or Tandy 16-color; supports Ad Lib and Sound Blaster, supports mouse and joystick—$49.99

Also available for Amiga—$49.99 and Atari ST—$49.99

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GAMEPLAY

Orson Scott Card

CENSORING THE FUN OUT OF PRODIGY?

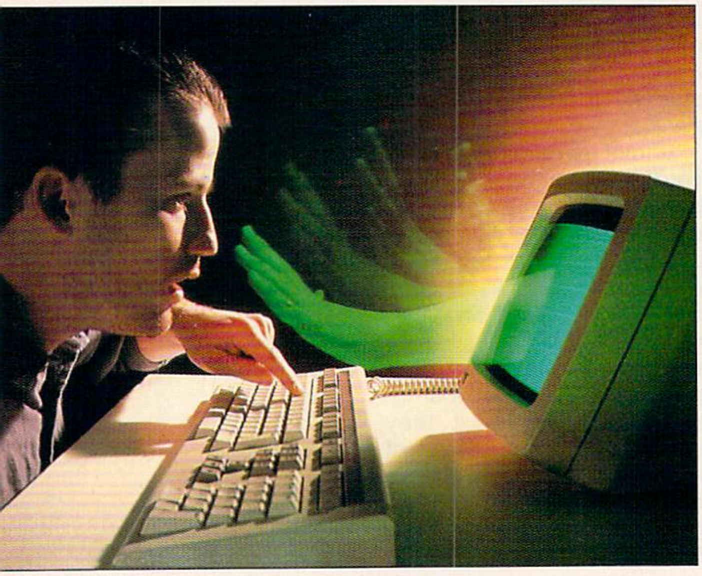
A few columns back I talked about the online service Prodigy. All the good things I said are still true: It still has the simplest interface I've seen for allowing complete novices to access everything the service offers. But in one area, at least, Prodigy has succumbed to the principle that guides far too many software companies: "Do it my way, you poor ignorant user."

Oddly, the area where Prodigy is blowing it in a big way is with one of its *best* ideas: editing the bulletin boards.

The bulletin boards are major sources for online entertainment. A witty few engage in scintillating conversation while others listen and think and occasionally interject comments of their own. It's the electronic equivalent of the general store.

Prodigy, you've got a great thing going. All you have to do to make it perfect is to tell your editors to lighten up.

People often post "public conversation" that should have been private, so when you sign on, you have to wade through mountains of meaningless personal trivia. Prodigy had the right idea when it installed editors for the bulletin boards to weed out messages that ought to have been sent privately. When you browse through the board, you're given a menu of all the possible subjects and can take a look at any that seem interesting. You waste far less time trudging through things that don't interest you before getting to the things that do.



Alas, there are problems.

First, when Prodigy returns a message to you, its explanation is cold and impersonal and tells you almost nothing about why your message was deemed unworthy. It can be frustrating when a message you spent time composing is rejected without an apology.

Second, it has run into a standard problem with all editors everywhere—Correction Anxiety Syndrome: The editor is reading along and hasn't corrected anything in a long time and gets more and more nervous *(what mistakes am I missing?)* until finally he starts correcting things that aren't wrong at all. When I talked to a Prodigy troubleshooter (a person without authority whose job is to listen patiently until the complainer feels better), I was told proudly, "After all, more than 26,000 messages have been posted." "Out of how many?" I asked. "More than 28,000," he said.

Since Prodigy is rejecting almost 8 percent of the members' postings, practically everyone is going to have a message rejected for every dozen postings.

Third, its rules are too rigid. For instance, some users were playing games they had invented in the Writing topic of the Arts Club. Under subject headings like "12-Word Love Stories" and "3-Word Stories," they were inventing clever and resourceful phrases and sentences that implied whole novels of characters, relationships, and events; many were screamingly funny.

Suddenly Prodigy wiped out the game, rejecting all new postings to those subjects. Why? Because the Writing topic was "not meant to be used for posting original literature."

How absurd! These people weren't posting the stories and poems they meant to mail off to magazines. They were playing *games* together, and the games were killed because the editors didn't understand them.

Here you have an entertainment network that sells advertising time for public conversations, many of which are wonderfully clever and entertaining and informative.

Then, as if it entirely missed the point of its own enterprise, Prodigy hires people to step into the room and, with almost no understanding of what the conversation is about, say, "You've gotten off the subject. You'll have to talk about something else." Or, "We never thought of anybody's using this topic this way, so stop it."

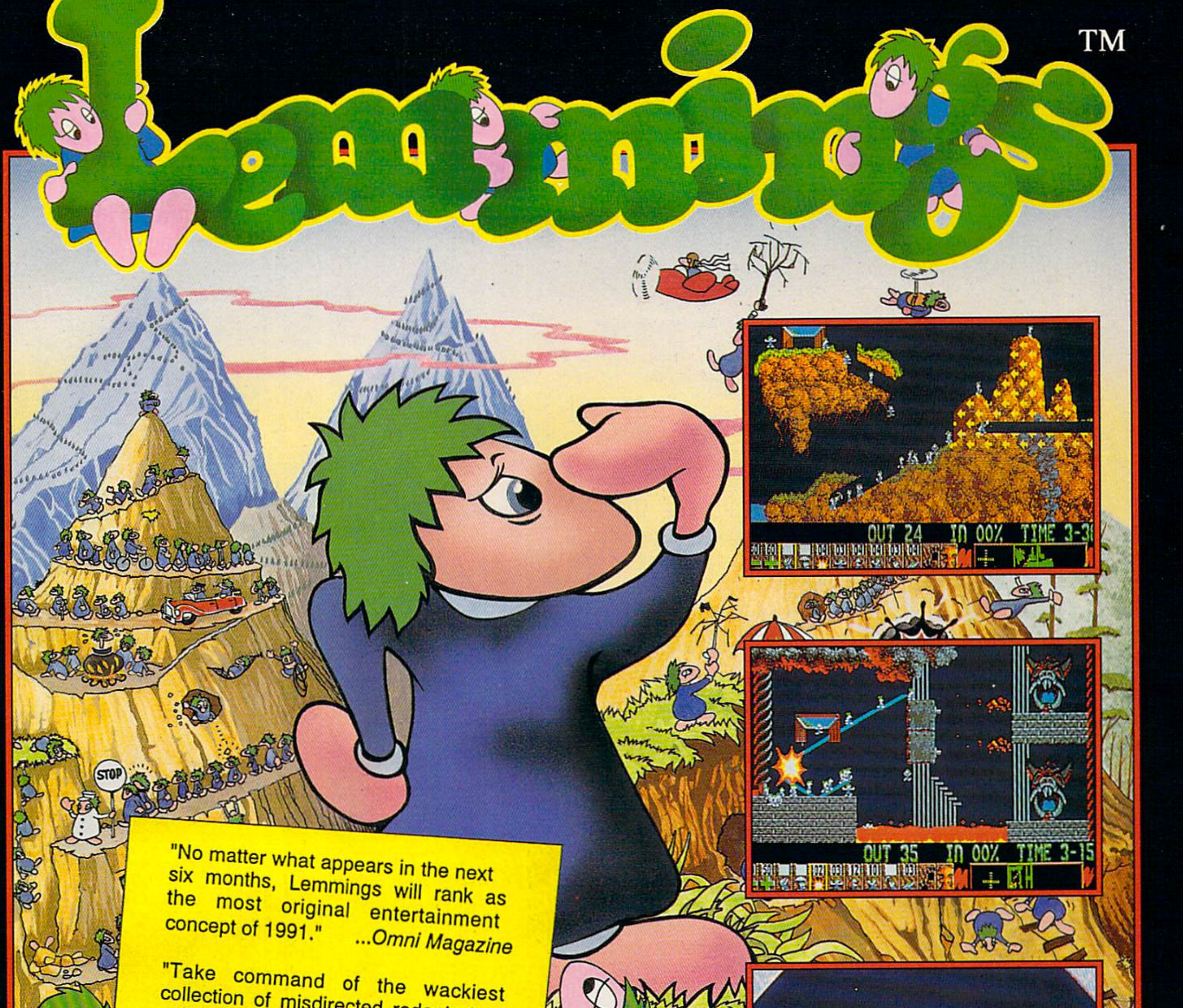
Prodigy, you've got a great thing going. All you have to do to make it perfect is to tell your editors to lighten up.

Let your users create entertainment for themselves. Keep on rejecting the *truly* private conversations, but let the rest of the messages through.

If you don't, I'm afraid you'll find the best and most creative of the conversationalists going to some other service, and you'll soon find Prodigy—both the good and the bad—dead and buried.

I hope other services are looking at what Prodigy is doing right, because if they learn the right lessons and avoid the "Do it my way" principle, we will eagerly embrace those services the way we've tried to embrace Prodigy. ❐

"A UNIQUE MINDBOGGLING GAME OF ADVENTURE, ROMANCE AND SALVATION!"



"No matter what appears in the next six months, Lemmings will rank as the most original entertainment concept of 1991." ...*Omni Magazine*

"Take command of the wackiest collection of misdirected rodents to guide them through a bizarre world of obstacles and danger: 120 levels of irresistably challenging game play that will rattle your brain and keep you in stitches!"

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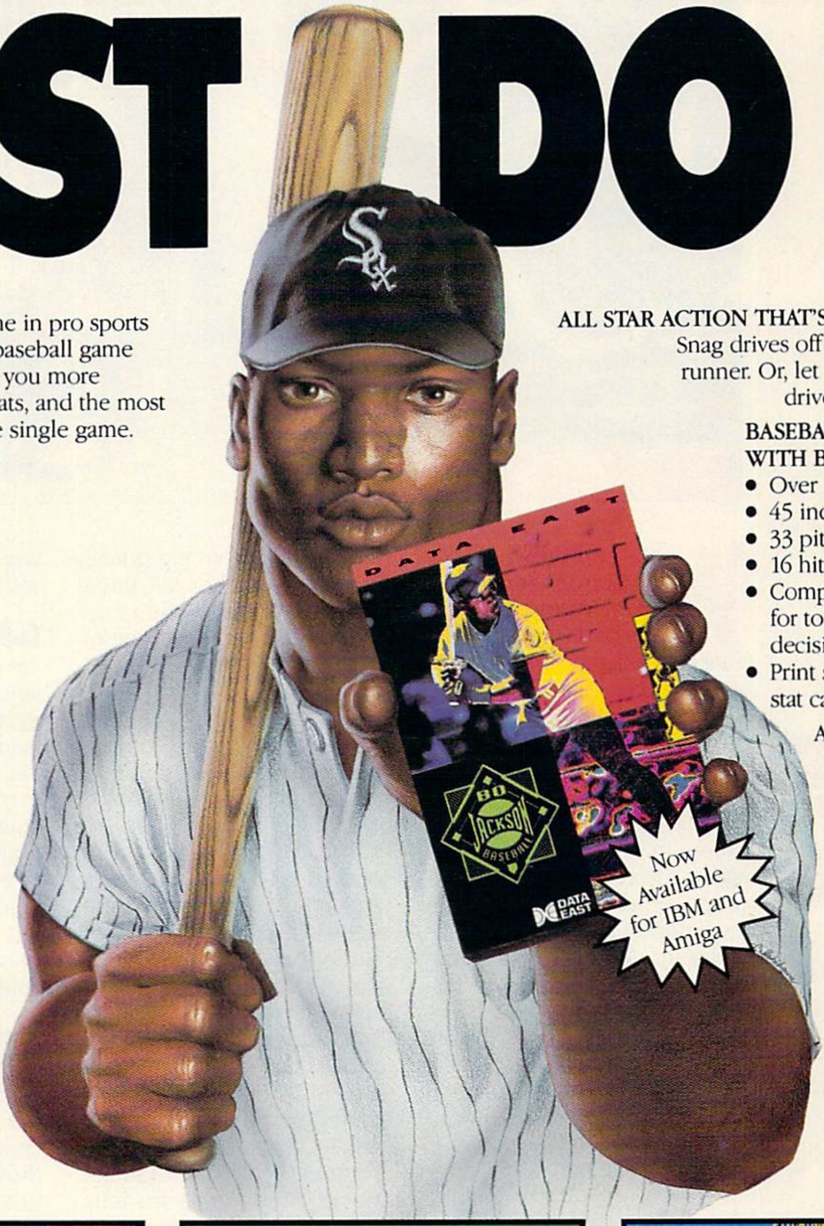
SPECIAL REPORT

BY TOM NETSEL AND PETER SCISCO

This summer's Consumer Electronic Show had a little bit for everyone.

BO JACKSON BASEBALL

JUST DO IT.



Now, from the biggest name in pro sports today, comes the greatest baseball game ever assembled! Bo brings you more realistic action, far more stats, and the most impressive graphics in one single game.

CATCH THESE FEATURES

- Authentic lifelike player animations
- Digitized sound and atmospheric effects
- Arcade style 256-color VGA graphics
- Create your own team of righthanders and southpaws
- Edit players for batting and pitching, by arm strength, running speed, and much more
- Make play by play decisions
- Go head-to-head or against the computer with as many as 26 players
- Authentic 162 game series, play-off series and championship play

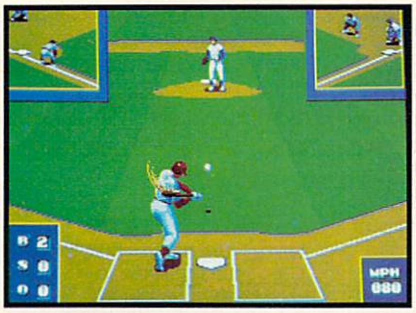
ALL STAR ACTION THAT'S JACKSON PACKED! Snag drives off the wall and nail the runner. Or, let Bo show you how to drive one over the fence.

BASEBALL STRATEGY WITH BONA FIDE STATS!

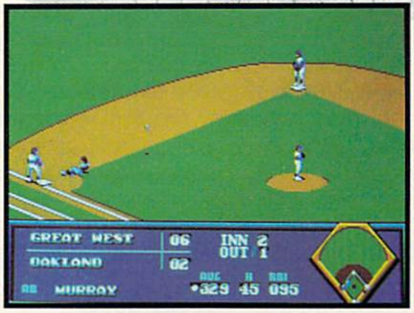
- Over 100 recorded ratings
- 45 individual stats
- 33 pitching categories
- 16 hitting categories
- Complete player control for tough fielding decisions
- Print stats for every major stat category

All this is baseball the way it's supposed to be—**What are you waiting for?**

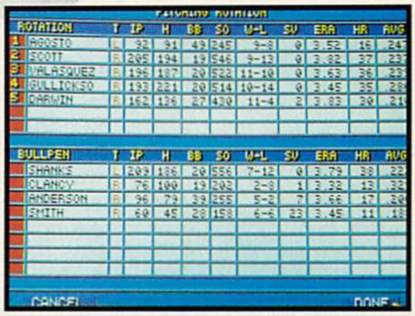
JUST DO IT.



Complete view of all the action on the bases when you are at bat.



Detailed, crisp graphics.



PITCHING ROTATION

ROTATION	T	IP	H	BB	SO	W-L	SV	ERA	HR	AVG
1 AGOSTO	L	92	91	49	245	9-8	0	3.52	16	.24
2 SCOTT	R	205	194	19	546	9-13	0	3.82	37	.23
3 VALASQUEZ	R	196	187	20	522	11-10	0	3.63	36	.23
4 GULLICKSO	R	193	221	20	514	10-14	0	3.45	35	.28
5 DARWIN	R	162	136	27	430	11-4	2	3.83	30	.21

BULLPEN	T	IP	H	BB	SO	W-L	SV	ERA	HR	AVG
SHANKS	L	209	186	20	556	7-12	0	3.79	38	.22
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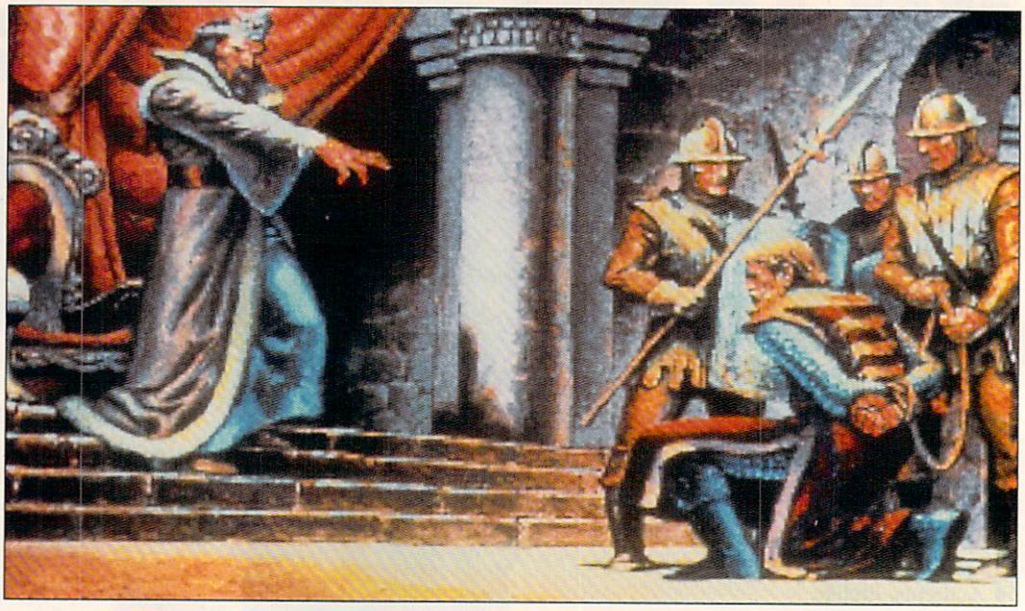

While the rest of the consumer electronics industry languishes in recession, computer makers and software developers are experiencing steady, if less than spectacular, growth. The thrills surrounding the PC and videogame exhibits at the 1991 International Consumer Electronics Show in Chicago were bolstered by advances in PC software entertainment and a new generation of videogame consoles. More than 250 companies that had never participated in a Summer CES, including IBM, Wang Labs, Leading Edge, and Prodigy, picked up on the excitement. Here's a preview of some of the products that are heading your way this fall.

Better sound, improved graphics and adventures, more creative play, and a host of roles are on the way with this year's crop of consumer entertainment software and hardware.

Accolade

Who is kidnapping the biggest stars in Hollywood? To help you solve this sinister mystery, call in the man who found the world's greatest entertainer in Accolade's first graphic adventure, *Search for the King,* and now stars in the sequel, *Les Manly In: Lost in L.A.* ($59.95).

Mike Ditka Ultimate Football ($54.95) is the first football simulation to feature multi-angle player perspective, allowing computer coaches to view the action from any of four different viewing angles.

In *Elvira II: The Jaws of Cerberus* ($59.95) players must rescue Elvira from the ghastly Cerberus, a 60-foot tall, three-headed demon. See our Sneak Peek of this game on page 121 in this issue.

Ad Lib

The competition among sound-card makers heats up with Ad Lib's announcement of its Gold Series. The Gold PC-1000 ($300) is a basic sound card for disk-based applications that features a microphone jack and tabletop microphone, game and MIDI ports, and standard stereo input/output jacks. The Gold PC-2000 ($400) adds a SCSI interface for CD-ROM applications. The Gold MC-2000 ($500) is designed for the IBM PS/2 MCA bus. All of the cards carry 20 channels of synthesized sound, 2 channels for sampled sound, stereo recording and playback, enhanced FM synthesis, 12-bit stereo digital-to-analog conversion and other professional features. Originally scheduled for a late summer release, Ad Lib says chip shortages have delayed release of the Gold Series until late fall at the earliest.

Brøderbund

Game designer Chris Crawford is back with *Patton Strikes Back* ($59.95). This strategy game puts you in command of Allied or Axis troops during the Battle of the Bulge. This war game emphasizes tactical thinking over weapons skills. It's packed with data and analysis.

California Dreams

Take over as leader of Poland's workers union in *Solidarity* ($59.95) and attempt to lead the country to freedom in the face of tremendous Soviet military and economic pressures. Or, take the helm of a high-tech submarine in *Wreck Hunters* (price not available at press time), the working title of a new interactive game in which you search for sunken treasure.

Data East

Data East's latest combat game is—get this—compatible with Novell networks. Guide a fleet of mechanized droids against an alien race that has practically obliterated humanity from the face of the planet. Operate scout, supply, and soldier robots over a harsh landscape. A two-player mode allows for cooperative play against the mysterious aliens. The network version will support from six to seven players. The standalone version of *Ultrabots Sanction: Earth* will ship to stores this month. The company expects to have the network version ready by late November (just in time for that Christmas office party). The price wasn't available at press time.

Data East's other introductions included *Battlefield*

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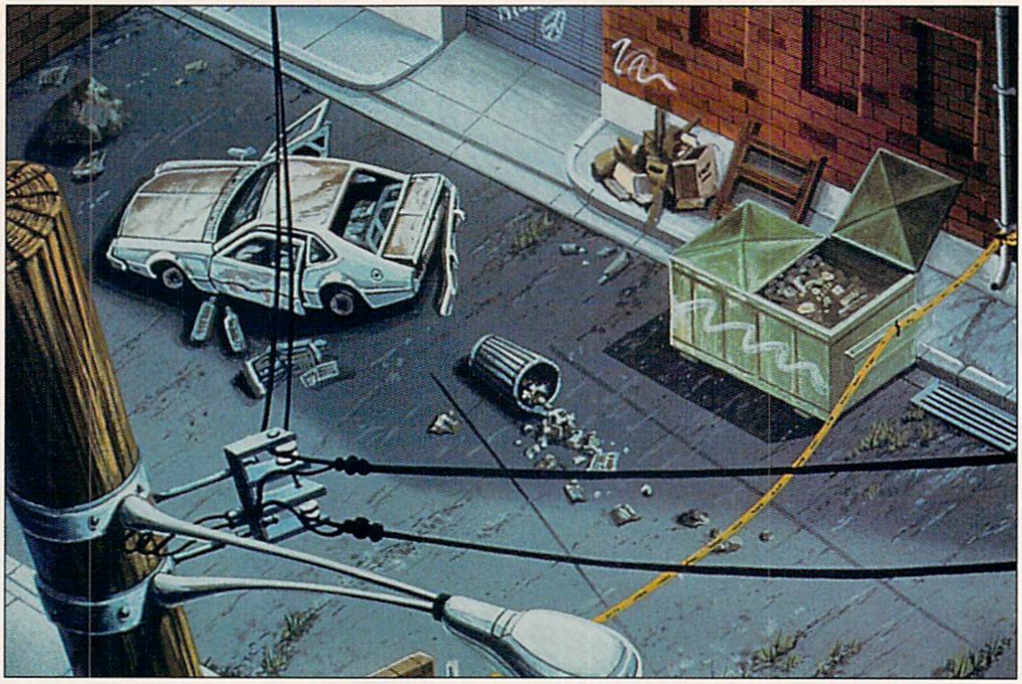


Adventure games that move from city streets to outer space, from underground to the magic realms of imagination—plus sports, flight simulators, and laser television.

2000, the working title for a tank-battle game ($59.95), *Bo Jackson Baseball* ($49.95), and *ABC Wide World of Sports Boxing* (price unavailable at press time).

Electronic Arts

Big new products from EA include *Chuck Yeager's Air Combat* ($59.95) and *Earl Weaver Baseball II* ($49.95). A Sneak Peek of *Air Combat* appeared in the July issue of *COMPUTE*. Racing fans can get behind the wheel of *Mario Andretti's Racing Challenge* ($49.95).

Powermonger ($49.95), from the makers of *Populous*, casts you as the leader of a displaced tribe newly arrived in an uncharted territory.

Electronic Zoo

This fall, look for *Eco Phantoms* ($49.95), a struggle for earth's survival; *The Ball Game* ($49.95), a test of strategy and reflexes; *Geisha* ($49.95), the Orient of the future; *Star Collection* ($29.95), a collection of great arcade hits; and *Peghole* ($49.95), a classic tactical game.

Konami

Simpson fans can get radical with *Bart Simpson's House of Weirdness* ($49.95), an adventure/strategy game that challenges players to be as resourceful as Bart. *Simpson's Arcade* ($49.95) is a conversion of the coin-op.

Challenge your ninja skills and fight crime in Manhattan with *Teenage Mutant Ninja Turtles: The Adventure* ($49.95). If you want more Turtle action, try *Teenage Mutant Ninja Turtles: The Arcade Game* ($49.95). More movie action is heading your way with *Back to the Future III* ($39.95) and *Predator 2* ($19.95).

Baseball card collectors have a new utility to help them manage and track their collections. It's the *Official Collector Series—Baseball Card Collector* ($49.95). This could make an excellent holiday gift for the hardball fan on your list.

Topping the long list of Konami's brand-new role-playing games is Steve Peterson's

LASERWARE

Recent innovations could change the way we regard our favorite optically-based storage device.

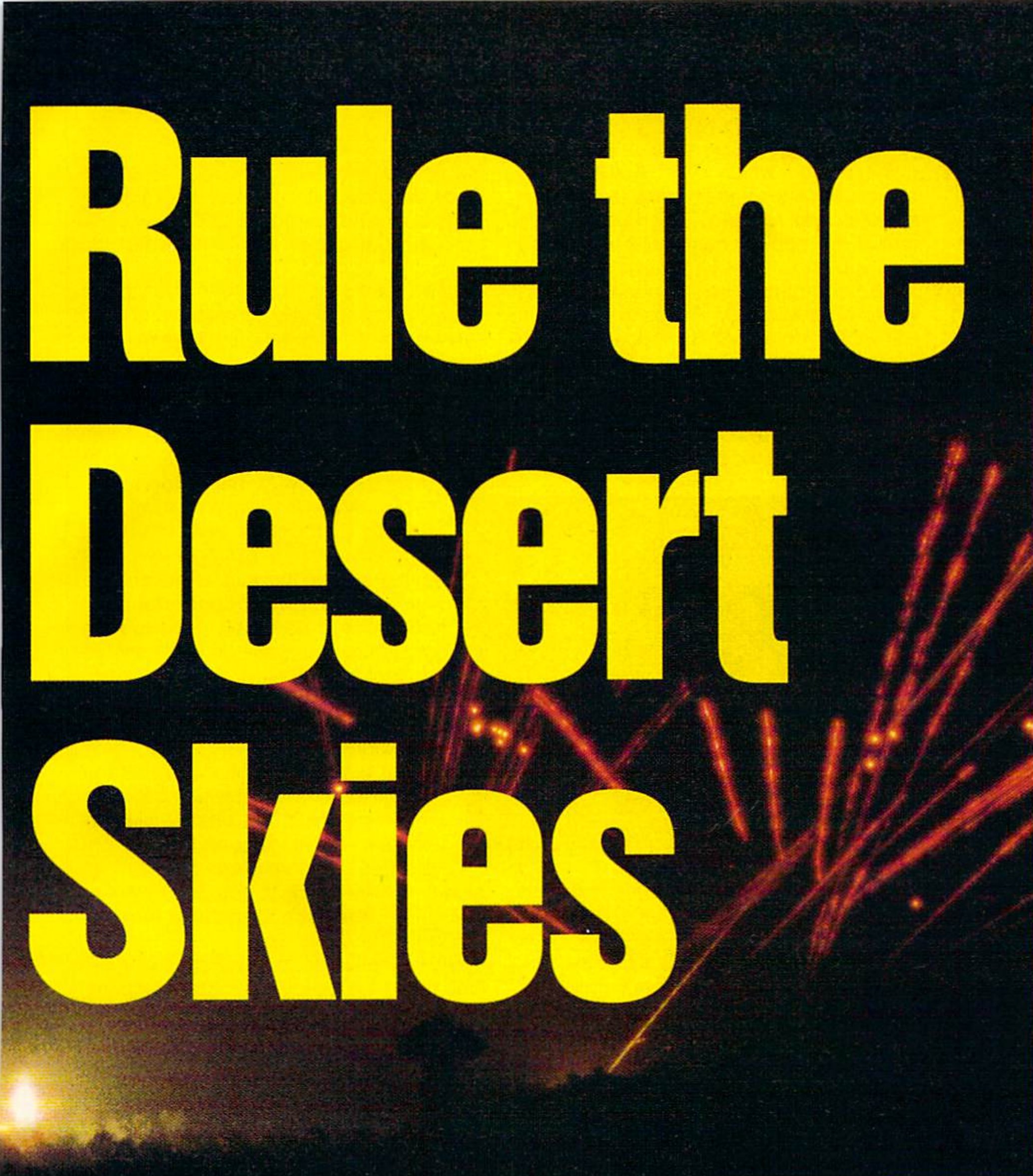
The Commodore booth at CES was almost entirely devoted to CDTV, a portent of the impending consumer interest in CD technology.

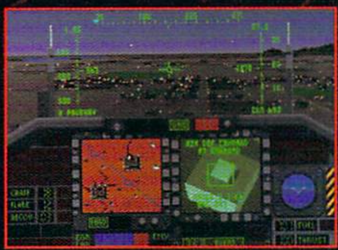
North American Philips/Magnavox was once again showing their long-delayed CD-I (Compact Disc-Interactive) player, this time promising that it would ship in October. Similar in concept to CDTV, the CD-I player has a few advantages: it sports a 16-million-color palette, a slightly faster processor and, most important, has the marketing muscle of Magnavox, Sony, and Matsushita (Panasonic) behind it. However, it also has its share of disadvantages: It's more expensive ($1400 compared to CDTV's $999), and its "thumbstick" controller is less familiar to American kids than the CDTV's Nintendo-like joypad (and more fragile).

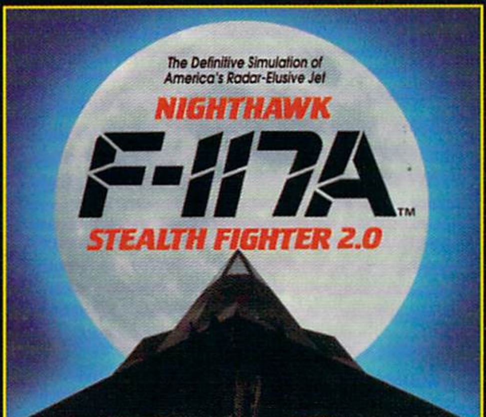
Another CD product making the rounds was Sony's consumer-oriented CD-ROM drive for the IBM PC. Called the Laser Library, the system consists of an external CD-ROM drive with audio capability and a collection of six topnotch CD-ROM titles. The entire library retails for $699.

With Kodak's new Photo CD, you can take pictures using conventional 35mm film, and then have those photos developed and stored on compact disc for viewing on a TV or for use in image-processing software. Photo CDs will work with either a CDTV, CD-I, or dedicated Photo CD player. Kodak expects Photo CD processing to be available by June 1992.

DENNY ATKIN and DAVID SEARS







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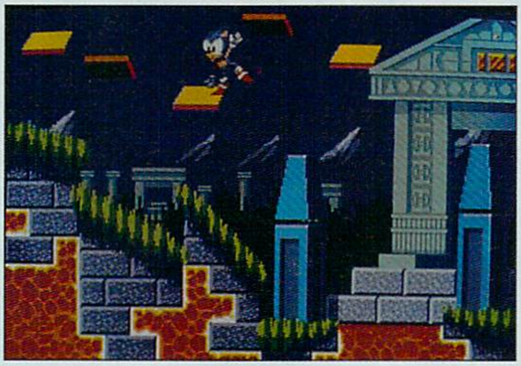

The war for the hearts and minds of America's videogame players reached a peak at this summer's CES, with volleys from all major players. The smoke won't clear until after the holiday season. Sega announced a new CD-ROM accessory for the Genesis, Nintendo aligned itself with N.V. Philips and CD-I, NEC launched a new line of CD-ROM interactive videogames, and SNK added 12 new titles to its NEO GEO library.

On the Sega front, an affordable CD-ROM accessory for the Genesis was announced for an early 1992 release. The player's high-speed laser pick-up drive mechanism, 16-bit microprocessors in both the Genesis machine and the CD-ROM drive, a large-capacity RAM buffer, advanced biaxial rotation and zoom functions, and eight-channel digital stereo sound source should add up to supersonic game action, CD-quality audio, arcade-style sound effects, and graphics to the max.

Sega's biggest game news was *Sonic the Hedgehog.* Faster than a speeding bullet and sure to gain the quick allegiance of arcade gamers everywhere, *Sonic* is reason enough for anyone to buy the Genesis machine. *Sonic the Hedgehog* replaces *Altered-Beast* as the game packaged with Genesis machines.

By year's end, Sega plans to have 17 new Genesis games out. Those include *Toe Jam & Earl,* featuring two very cool, rhythmically inclined, junk-food-loving aliens from the planet Funkatron; *Fantasia,* taken from the Walt Disney classic; and the underwater military simulation *688 Attack Sub.*

Digital stereo sound, multiple scrolling screens, three-dimensional graphics, and a palette of 32,768 colors blast through Nintendo's Super NES, scheduled to reach store shelves this September. Despite the troubled economy, Nintendo predicted it will sell more than 2 million Super NES units by year's end, priced around $200 each, and 6 million games for the machine, most of which will cost around $50 apiece. Nintendo has no plans to abandon either its 8-bit Nintendo Entertainment System or the popular hand-held Game Boy machine.

The company also announced that it would work with N. V. Philips to develop a CD-ROM accessory for the Super NES that would be compatible with both the new video game system and CD-I. Nintendo also intends to pursue its work with Sony on a separate CD-based game system.

NEC dropped the price of its TurboGrafx-16 system to $99.99 and concentrated its efforts on the TurboGrafx-CD player, which sells now for $299. For $149.99, a new version of the TurboGrafx-16 system, called Bonk SuperSet, is packaged with two TurboPad controllers, a TurboTop adaptor that allows for up to five players at once, and NEC's most popular game, *Bonk's Adventure.*

NEC also sealed a deal with Paramount Pictures to release ICOM Simulations' CD-ROM version of the *The Addams Family.* Based on the popular sixties television show, the movie is scheduled to premiere in November. Also in NEC's new CD-ROM library, *Sherlock Holmes, Consulting Detective,* based on the renowned clever guy, uses digitized movie footage of live actors. For *J.B. Harold Murder Club,* digitized still photos blended with voices will be used. For an educational tour through prehistoric times, *Magical Dinosaur Tour* is an animated encyclopedia featuring 200 types of dinosaurs. The games will retail for $61.99 each.

SNK attracted more players to its pricey, but graphically superior, NEO GEO system with 12 new action games ranging from sports to fantasy.

For sports buffs, there's *Top Players Golf,* which gives players a bird's-eye view of the course and then lets them "stand" behind the onscreen golfer to drive the ball with real-life perspective. *League Bowling's* multilink capability adds more zest than real lanes can offer. *Riding Hero* puts gamers in the fast lane of motorcycle racing, whizzing around mountain curves and barreling down ocean straightaways. Baseball buffs should delight over *Baseball Stars Professional,* with real-voice announcers and umpires making the calls for over 20 different teams.

For the combat thirsty, there's the fast-reflex action of *Ninja Combat,* dogfights galore in the enemy-filled air zones of *Ghost Pilots,* and bloody jungle battles as veterans return to Vietnam in *NAM-1975.* James Bond wannabes go up against a formidable terrorist group in *The Super Spy.*

Sci-fi fanatics get the challenge of a lifetime trying to destroy the super computer that controls thousands of lunatic androids in SNK's *Cyber-Lip.* Fantasy lovers can wreak havoc on cities while wrestling monsters in *King of the Monsters.*

In Magician Lord, players assume the role of Elta, a young magician able to assume new identities while searching for books of wisdom and magic in four uncanny dimensions—a real treat for fantasy arcade fans. Rounding out the selection, fast-action arcade game fans should love the challenge of jumping Blue through a host of strange cities in *Blue's Journey.*

JILL CHAMPION, CHANTELLE OLIGSCHLAEGER, ERIN RICHTER

Champions ($59.95), a multipart adventure with more than 20 villains to conquer. *The Killing Cloud* ($49.95) has you fighting an organized gang in San Francisco. For the more fantastically oriented, *Riders of Rohan* ($49.95) gives players a chance to build their own saga in true Tolkien flavor. If Middle Earth doesn't appeal to you, perhaps outer space does. Try *Spacewrecked: 14 Billion Light Years From Earth* ($49.95). Or venture into inner space in the ancient thriller *Bloodwych* ($39.95). For couch potatoes, *Mission: Impossible* ($49.95) combines action, adventure, and role-playing—if you choose to accept it.

Two Konami simulations include *Team Suzuki* ($39.95) and *Top Gun Head-to-Head Dogfighting Simulator* ($49.95). Action gamers can test their roller derby skills in the high-contact game *RollerBabes* ($39.95). *Speedball 2* ($39.95) is a futuristic sport featuring armor and weaponry.

LucasArts Entertainment

Guybrush Threepwood is back in a swashbuckling adventure called *The Secret of Monkey Island II: LeChuck's Revenge* ($59.95). Visit new puzzle-packed islands with many of the zany characters from the first game. And look for an original game not based on a movie in *Indiana Jones and the Fate of Atlantis* ($59.95). Indy is drawn into the ancient mysteries of the fascinating and legendary undersea world.

Maxis

This fall's oddest game just might be *SimAnt* (price unavailable), an ant colony simulation (no kidding) complete with rival bands of black and red ants, a hungry spider, a nosy kid with a mean garden hose, and a pesky dog. Try to get your colony inside the house, where the really good food is.

MicroProse

MicroProse has a large slate of products scheduled for fall and spring releases. Topping the list is Sid Meier's *Civilization* (price unavailable). This simulation begins in 4000 B.C. and players must develop an entire civilization from a small, nomadic tribe. By balancing economics, politics, and defense,

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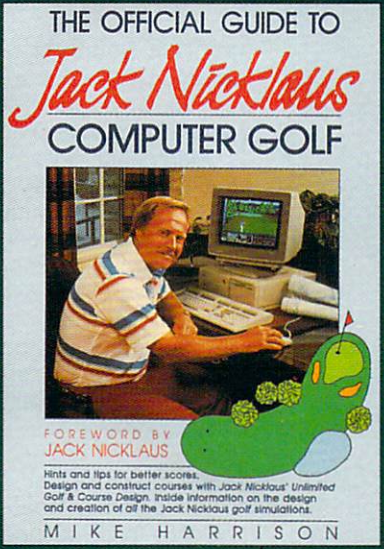
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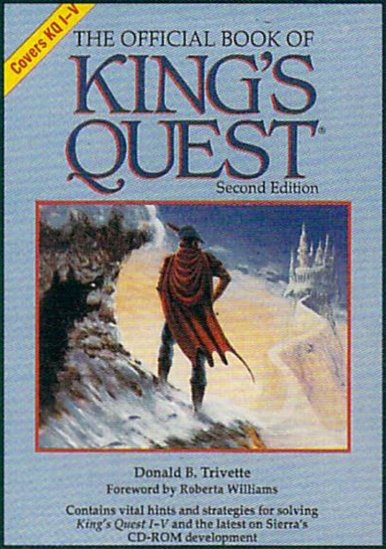
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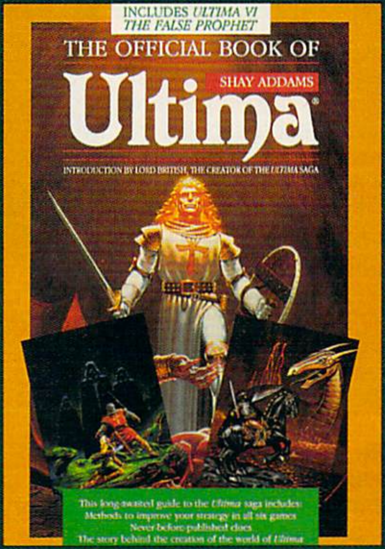
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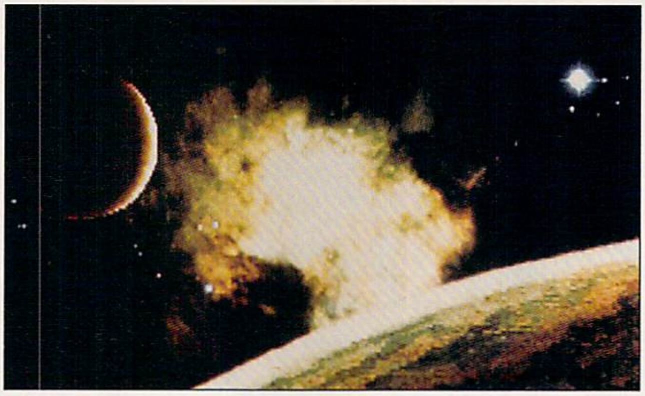
The spring of 1992 will bring MicroProse's first fantasy role-playing game. Live in fifteenth century Germany, a violent time of three popes, powerless emperors, gangster nobles, and venal clergymen. *Darklands* emphasizes people's belief in witches, magic, alchemists, and dragons. Guide your party of four on a quest for fame, fortune, and immortality in the Dark Ages.



Also slated for future release from MicroProse and its Paragon subsidiary are *Codename: White Shadow* (price unavailable), *Flames of Freedom* ($49.95), and *Twilight 2000* ($59.95).

Origin

Once again Richard "Lord British" Garriott and Origin have plans to transport you to another world in the popular Ultima series. Look for improved technology and better narrative elements in *Ultima VII: The Black Gate* ($79.95), scheduled for release in December.

The popular sword and sorcery elements combine with more screen detail, 256-color VGA graphics, new methods of conversing and interacting with characters, and sounds so real that you can actually hear rivers flowing and crickets chirping.

Another eagerly awaited release is *Wing Commander II: Vengeance of Kilrathi* ($79.95). This starfighter sequel offers exciting 3-D VGA graphics set on digitized backgrounds and will take advantage of speech synthesis that employs the speech chip in the CMS Sound Blaster. Also, another step in the Wing Commander series is Chris Roberts' *Strike Commander* ($79.95). This time you are part of a mercenary squad, flying a fine line between right and wrong, profit and loss. You must determine the viability of missions from a moral as well as a logistical standpoint. Pilot a staggering array of aircraft from a P38 to an F22 Lightning 2 as you engage rival squadrons and renegade Third World dictators.

Spectrum HoloByte

Wordtris ($39.95) is a must buy for any fan of word games and puzzle challenges. Manipulate falling letter blocks so that they spell words either horizontally or vertically on the screen.

The Cyrillic connection continues with *Crisis in the Kremlin* ($59.95), in which you assume the role of Soviet President. Guide the U.S.S.R. out of its present economic quagmire and inherent instability, or risk social disintegration.

Sierra On-Line

The folks in the California mountains are moving boldly into CD technology,

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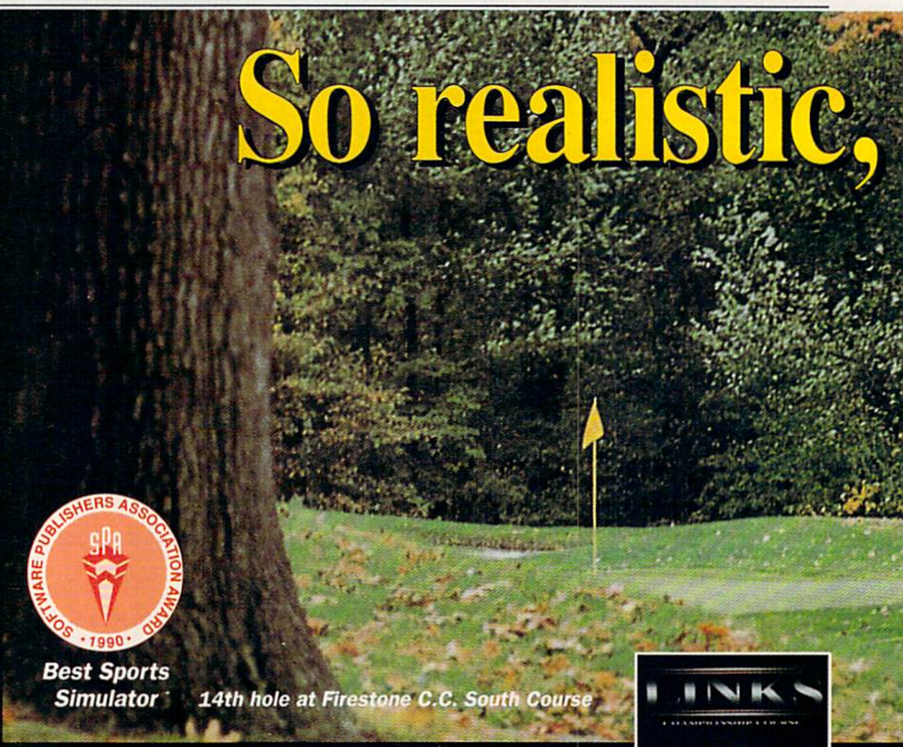
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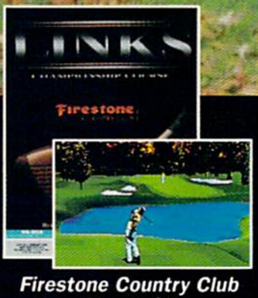


Firestone Country Club Akron, OH

with several of their more popular games slated for CD-ROM release. They include *Space Quest IV, Leisure Suit Larry I,* and *King's Quest V.* All of the CD-ROM titles are priced at $59.95 and are designed for the IBM PC.

On the MS-DOS disk side, you'll be seeing *Mixed Up Fairy Tales* ($49.95), *Castle of Dr. Brain* ($49.95), *EcoQuest: The Search for Cetus* ($59.95), *Leisure Suit Larry 5: Passionate Patti Does a Little Undercover Work* ($59.95), *The Laffer Utilities* ($34.95), *Conquests of the Longbow: The Legend of Robin Hood* ($59.95), and *Police Quest 3: The Kindred* ($59.95).

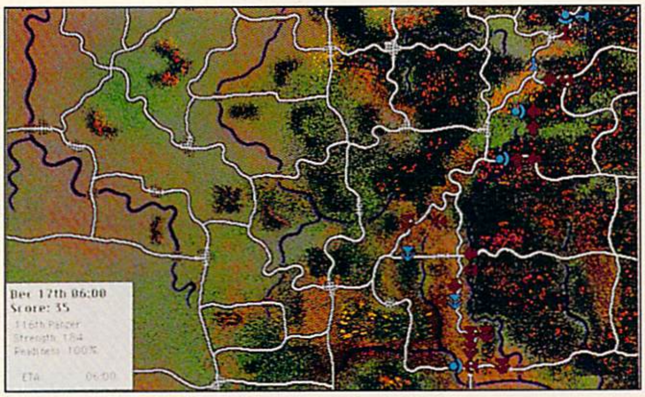
Sierra's Dynamix subsidiary will bring *Nova 9* ($34.95), a sequel to *Stellar 7*, and *Adventures of Willy Beamish* ($59.95) to the PC screen this fall and winter.

Strategic Simulations

SSI introduced its first IBM sports game, *Tony La Russa's Ultimate Baseball* ($49.95). Every essential detail of major league baseball is provided; play a whole season or one game in a variety of levels. As current as today's headlines, *Conflict: Middle East* ($59.95) is a new strategy war game focusing on desert combat. SSI also has a new AD&D "goldbox" game, *Gateway to the Savage Frontier* ($49.95).

Three-Sixty

Three-Sixty's fall lineup includes two war games and a sports package. *Theatre of War* ($49.95) is a strategy war game boasting a 3-D filled-polygon environment. *Patriot* ($59.95) is a land-based war game. The *ABC Wide World of Sports Winter Olympics 1992* ($49.95) gets the events down cold.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In *Battle Isle* ($49.95) your goal is to capture the most terrain possible in a world made of islands. For sports fans, *Pro Tennis Tour II* ($49.95), improves on the original by including female opponents, the choice of strong or weak points of your player, doubles play, a training mode, improved graphics and better music. Here's your chance to improve your net play.

Virgin Games

Fantasy and flight fill the bill here. *Conan the Cimmerian* ($49.99) puts you in the role of Conan. You must avenge the deaths of your family and friends who were massacred by the ravening hordes of Thoth Amon, high priest of the vile cult of Set. If that sounds like a little too much fun, you can get down to business with *Corporation* ($59.99), an action game that has you tracking down a mutant robot.

If flying is more in your line, then *Thunderhawk* ($49.99) puts you in the seat of the AH-73M Thunderhawk helicopter gunship. *Shuttle* ($59.99) is designed as an accurate simulation of NASA's Space Shuttle. During play you'll be asked to perform various feats like repairing satellites, maneuvering your spacecraft, and—oh yes—landing. ❐

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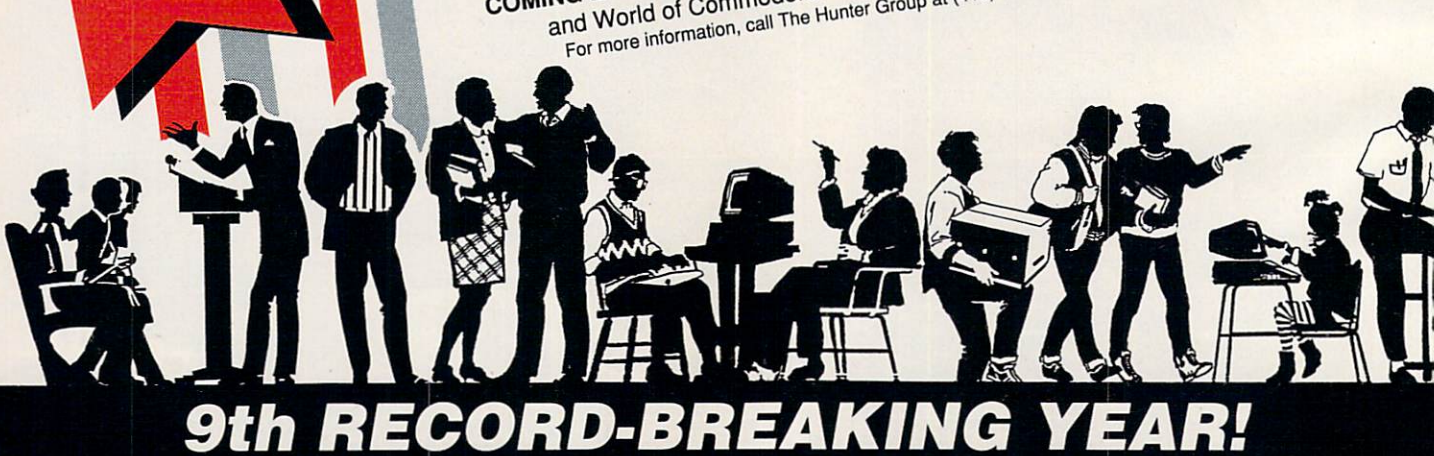


9th RECORD-BREAKING YEAR!

64/128 VIEW

You've asked for it, so here it is. Gazette goes online with QuantumLink.

Tom Netsel

Gazette is going online. Many of you have asked for it, and now it's here. Gazette will soon have its own area on QuantumLink, the Commodore-specific online service.

Soon you can call a local telephone number with your computer and modem, connect to Q-Link, and then move to the Gazette area. Once connected, you'll have access to millions of bytes of 64/128 information from our back issues of Gazette. Right now our staff is busy compiling more than six years' worth of articles, reviews, and programs to have them available by the September 15 target date.

Q-Linkers (Q-Link members) will be able to download practically any of the material that has ever appeared in Gazette. If you want to learn about disk drives, printer care and selection, music, graphics, *GEOS*, telecommunications, or other 64-related subjects, chances are that it's been covered in Gazette and it'll be online for downloading.

If you're planning to buy software for your 64 or 128 and you don't know which of several possible titles might best suit your needs, check the Gazette reviews. There will be hundreds of software reviews available of both current and classic 64 and 128 titles. Best of all, this information will be available when you want it and as close as your telephone. Think of all the great type-in programs that have appeared in Gazette over the years: games, utilities, educational programs, and productivity pieces. Now you can obtain any or all of these great programs without going through the effort of typing them in. Simply download and run.

Look for message areas, product information, and more. Each month Gazette publishes the best articles and programs that we can find, and we're constantly looking for new and exciting programs to offer our readers. As a convenience to programmers and to expedite our search for new software, programmers will be able to upload their submissions. We'll download them, test them, and reply to the authors much faster than we can by mail. Artists can also upload their "Gazette Gallery" submissions. Of course, we'll still accept submissions mailed on disk, but the upload feature will speed up the process.

Are there COMPUTE books dealing with the 64 or 128 that you want but find they're out of print? We'll have many of these titles online for downloading. That's right: Download a whole book, read it onscreen, and print out the sections you need. This will be the only source for some of this 64/128 information.

We are excited about this new venture. We may not have every feature up and running on opening day, but we expect the Gazette section to be a valuable online resource for 64 and 128 users. If you're not familiar with QuantumLink or you're not yet a member, check elsewhere in this issue for a special introductory Q-Link offer. When online, feel free to say hello or send some E-mail. My handle is Gaz. ❐

CONTENTS

64/128 VIEW G-1

Gazette is going online. Look for it soon on QuantumLink. Download your favorite programs, reviews, articles, and books.
By Tom Netsel.

TOO VALUABLE TO WASTE G-2

Despite the shift to IBM compatibles, schools in Nova Scotia still put their 64s to valuable use.
By John Elliott.

REVIEWS G-8

Bible Search, Star Control, Dragons of Flame, Centauri Alliance, and *Screen-Pro 64.*

FEEDBACK G-16

Questions and answers.

MACHINE LANGUAGE G-19

Handle most of your input/output commands with just six easy Kernal calls.
By Jim Butterfield.

BEGINNER BASIC G-20

Crashproof your programs. (Part 2.)
By Larry Cotton.

PROGRAMMER'S PAGE G-22

128 SYS calls, the midnight bug, and more.
By Randy Thompson.

GEOS G-23

Fight the jaggies, and be proud to display your *GEOS* documents.
By Steve Vander Ark.

D'IVERSIONS G-24

Virtual reality at the mall.
By Fred D'Ignazio.

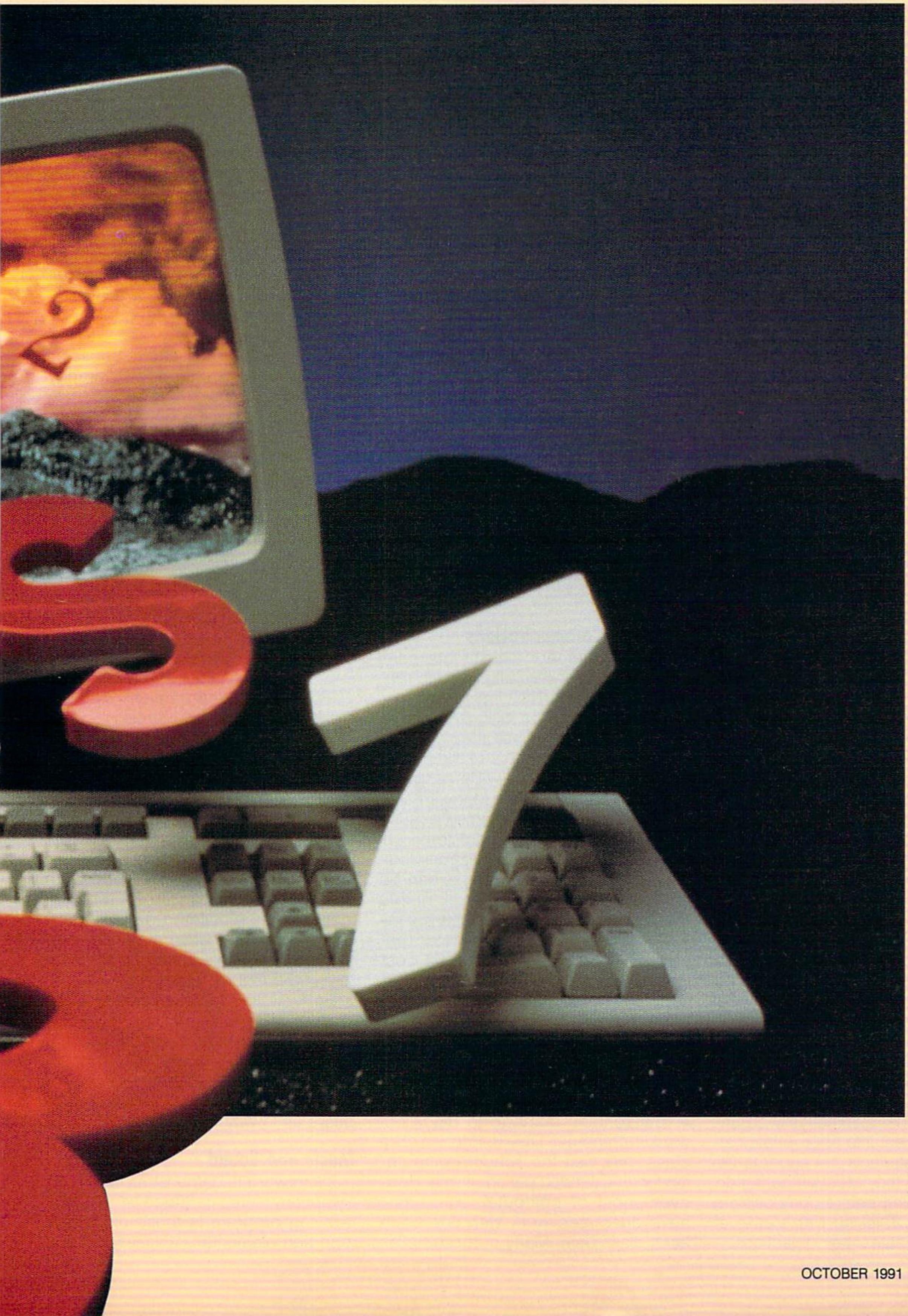
PROGRAMS

Speedway G-25
MOB Mover G-26
HoverJet G-30
Add Check G-33
Song Machine G-34

TOO VALUABLE TO WASTE

JOHN ELLIOTT

SCHOOLS IN NOVA SCOTIA PUT 64S TO WORK, DESPITE A MOVE TOWARD IBMS.



One Commodore 64 sits at the back of an elementary classroom. That's the way it is in many Canadian schools now. The 64 is used only as a reward for students who have completed their work. During those moments of use, the computer becomes an arcade-style game machine. Commodore 8-bit computers are a largely underutilized resource in Canadian schools, and a number of boards of education are replacing the 64s with IBM-compatible PCs at a cost many times that of the 64s. I am told at educational technology conferences that this is a common situation throughout North America.

I teach at Nova Scotia Teachers College. The college is located in the city of Truro (population 14,000), about 50 miles north of Halifax, Nova Scotia. While many of the people in this province speak English and are of Scottish and Loyalist descent, significant minorities speak Micmac (an Indian language), French, or Gaelic. The campus is the academic center for 600 students who practice their teaching throughout Nova Scotia. As a member of the faculty, I meet with student teachers and get to see how they and other teachers utilize computers in their classrooms. With school budgets being what they are, not everyone has made the switch to PCs. In many cases teachers and learners are employing existing equipment to further current curricular aims. This means using the 64 for something more useful than playing arcade games. Here are some examples of what I've found.

Word Processing

Grade 1 children are using a word processor *(SpeedScript)* to compose two-page stories. In this case they work with a battery of six 64s in the central computer room. During their language period they may be found either in their classroom or working on the 64s. At one point while the teacher and I were chatting, we were politely interrupted. A child wanted to know how to format his paragraphs.

As my teachers in training entered the province's classrooms, they learned the benefits of using an idea organizer to prepare before composing their documents. An idea organizer such as *Thinking Cap* allows a writer to brainstorm, switch sequences, easily erase, and do most word processing tasks. The outliner automatically organizes the document into appropriate categories. Most students are eager to begin writing, and they resist preparing an organizing outline before composing a document, but *Thinking Cap*'s ease of use usually placates their objections.

Word Processing Enhancements

My teaching interns have learned a number of other computer techniques that they can share with the children they teach. Once they use a spelling checker on their files, they then use a frequency check and a thesaurus program to deal with excessively used words. Since the 64's memory is limited, separate programs must be loaded sequentially.

The Write Stuff word processor for the 64 has an auditory option that, when activated, will say letters, words, or sentences with different intonations. There are educational possibilities with such features that can benefit both the visually impaired and students who are learning to touch-type.

Classroom Newspapers

Some elementary classes are preparing school newspapers with *Newsroom* publishing software. This is an effective way of providing a means for communicating both within a school and with the community. Students also get a good idea of the different aspects of newspaper production, from writing to publishing.

Modems allow both text and images to be shared between buildings or between a 64 and a PC as long as they both are working with *Newsroom.* The possibility remains for an electronic newspaper that can be read exclusively from the monitor.

Electronic Communications

Several elementary classes are communicating between buildings via modem. They either link up directly or leave messages on a local bulletin board. In the latter case they are also in contact with members of the general public who have a wide range of backgrounds and ages. Many smaller schools do not use modems because administrators are reluctant to tie up their one voice line. If an electronic bulletin board is used, messages can be composed and saved to disk before the destination is dialed. This keeps telephone tie-up time short. Now that 1200-baud modems for the 64 cost less than $50, message sending and capturing times should be very short. Received messages can be read from disk or buffer after the phone is hung up.

The One-Computer Classroom

A few schools manage to block out weekly computer time during which a class may visit the school computer lab for an extended period of time. However, most of computer activities I have described work with one 64 in each classroom. Many of these activities occur during language period and are consistent with the whole philosophy of language instruction.

The single-computer classroom can also use a student-controlled database. Students select the topics under which information about several events, places, or people will be entered. As they do their research, they enter the appropriate categories in the database. Higher level thinking begins when comparisons are made among entries under the same category.

Classroom Management

Much of the software recommended here can effectively help teachers equally as well as students. The word processor can be used to compose student handouts. The idea organizer can help plan a unit of work. *Newsroom* can be used to develop a parent-teacher newsletter. Some teachers use short BASIC programs to alphabetize a class list, enter and average grades (or marks), and rank the class by grade.

I allow my student teachers the option of submitting papers on disk. Using the insert option of the word processor, I place comments where they are relevant. The authors make their alterations and resave the document, with or without the insertions.

For classroom display purposes, I use a scroll program that rolls my comments from the top to the bottom of the screen. It permits a choice of screen and text colors and accompanying melodies. For my convenience, I videotape these sequences and take them into any class that has access to a VCR. These tapes help me demonstrate points during lectures.

Student Programming

Many of my teachers in training have taught young children to program in BASIC. These elementary students can develop simple multiple choice tests or programmed learning sequences for each other. It takes them about an hour to learn the required BASIC commands. As the children develop quizzes, they gain a sense of control over the machine, while analyzing the content of the test material itself.

Both student teachers and children learn to develop sequences in which a wrong answer causes the program to suggest what kind of thinking could have led to the correct answer. If the answer is correct, an explanation appears as to why it is correct.

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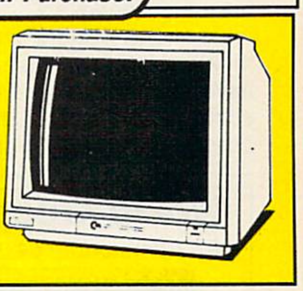

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Circle Reader Service Number 187

interested in music. While the 64 normally allows three simultaneous music channels, the stereo cartridge doubles this range. Much of today's popular music is composed and performed via multitrack computers. Most students would benefit from gaining some experience and understanding of this process.

I purchased a Voice Master Jr. digitizer that allows my 64 to recognize spoken words. Handicapped students or those who simply wish to limit their keyboard contact can benefit from this input device.

Elementary Economics

All of the hardware and software I have described here would cost $300 at most. A full-featured word processor for any of the PC compatibles could easily cost that much. The 64s are already in place in many of our classrooms. For as little as $30 each, these computers could be effectively utilized with one or two pieces of productivity software. For a couple of hundred dollars more, a school could share all of the other hardware and software I have mentioned.

I'd like to make a final point about making effective use of what you have, and this is true whether you're a school administrator or an individual computer owner. A friend of mine found some PETs in a school storeroom. He had his elementary children compose their documents with *Paperclip* loaded on these older machines. They then loaded their compositions into *Paperclip III* on a 64 for final formatting and printing. The point is that the children learned about writing and they were able to take copies of their completed papers home to show their parents. The children didn't care how old the computers were or how much they cost.

As I write this article with *SpeedScript* on a VIC 20 with 24K expansion, my wife is organizing a report employing *Thinking Cap* on our 64. I will later port this article via cassette to the 64 for word counting, word use analysis, spelling check, formatting, and printing.

In our family, the 64 and VIC 20 get used almost daily, handling a variety of sophisticated chores and projects. With very little additional expenditure of time, energy, or money, we should be able to use the 64 and its ancestors in our classrooms to expand our students' learning experiences. These resources are too valuable to waste.

John Elliott teaches both curriculum and research paper courses at Nova Scotia Teachers College. He also directs workshops regarding the classroom use of computers. ❒

PRODUCT LIST

Not all of the products John Elliott mentions in his article are readily available. Some titles are out of print, and some of the publishers have gone out of business. Many of the items can be found at larger software retailers, such as Software Support International, (800) 356-1179. The following products, however, should still be available at the addresses given.

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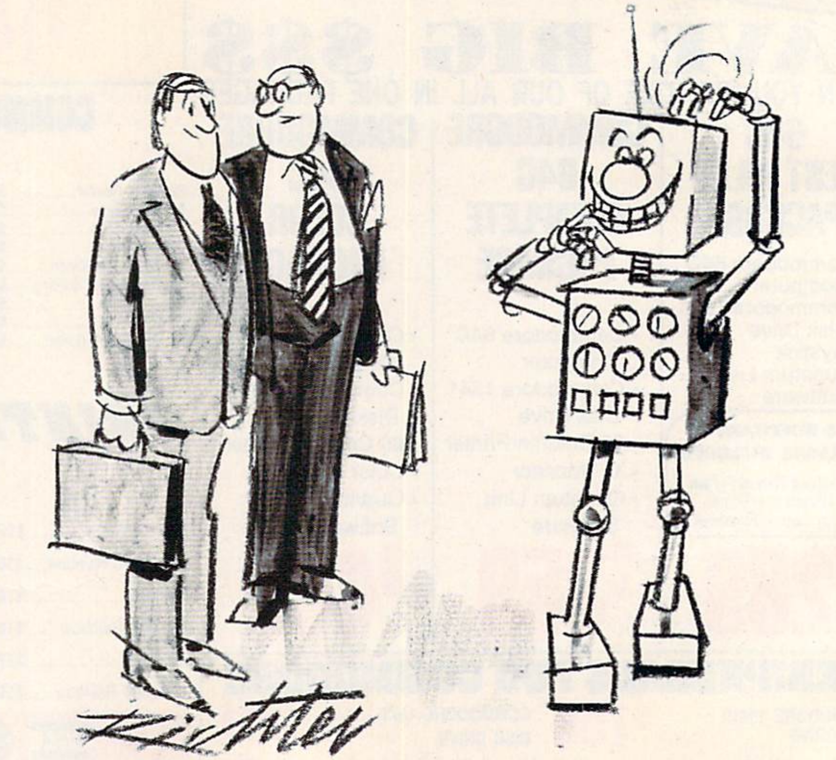

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BIBLE SEARCH

"The apple of his eye" and "Escaped with the skin of my teeth." Recognize these phrases? They are two of the most common clichés—the kind that got you into trouble with your high school English teacher. Do you know what else they have in common? Their origin is the Bible, and now they can also be found on disk for your 64 or 128.

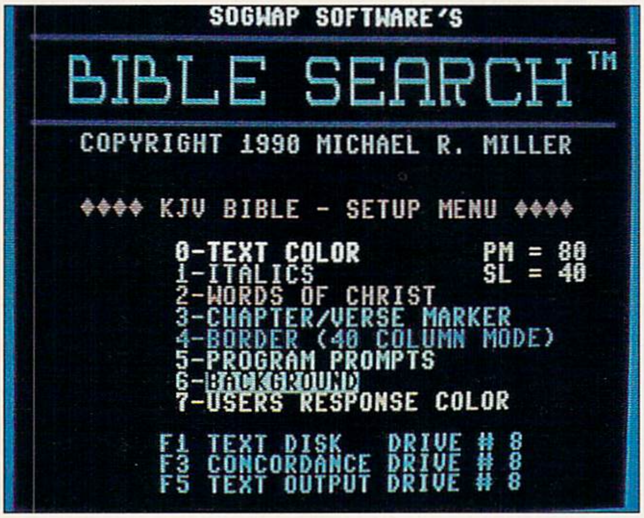
"Let all the people say, 'Amen,'" is another commonly used phrase.

SOGWAP Software presents *Bible Search* 3.1 in which Michael Miller has achieved the remarkable by offering the complete King James Version of the Bible on four double-sided 1541/71 disks, with an exhaustive cross-referenced concordance on two more. The program itself uses one disk.

Bible Search can search for and display words or verses easily and swiftly, even allowing for disk swaps. This speed allows you to spend more of your time meditating on scripture rather than looking for it.

The program opens with a setup menu that allows you to manipulate screen colors. In addition, you can alter the colors that indicate italics, the words of Christ, basic Bible text, the computer prompts, and the user's responses. After you have set your colors, pressing Return takes you into the program, where you can request to see a specific verse or begin a search for a word or specific phrase.

When a verse is displayed, you can view it in context with the verses that immediately precede and follow it. You can scroll forward and backward through surrounding text or skip to the first verse of the previous or next chapter. You can request a range of verses, too. Output can be directed to screen, disk, or printer. By successive moves you could print out the entire Bible straight from the program or save it to disk for use with a word processor, which would allow you to customize your printout.



```
SOGWAP SOFTWARE'S
BIBLE SEARCH TM
COPYRIGHT 1990 MICHAEL R. MILLER

♦♦♦♦ KJV BIBLE - SETUP MENU ♦♦♦♦

      0-TEXT COLOR             PM = 80
      1-ITALICS                SL = 40
      2-WORDS OF CHRIST
      3-CHAPTER/VERSE MARKER
      4-BORDER (40 COLUMN MODE)
      5-PROGRAM PROMPTS
      6-BACKGROUND
      7-USERS RESPONSE COLOR

     F1 TEXT DISK   DRIVE # 8
     F3 CONCORDANCE DRIVE # 8
     F5 TEXT OUTPUT DRIVE # 8
```

Locate any phrase in the Bible in less than two minutes.

Bible Search will find single words or groups of words. It divides the Bible into four sections (hence the four disks) and searches one section at a time. Being a smart program, it not only tells you when you have inserted the wrong disk or side in the drive but also tells you which one to put in. When it has found all the verses in the section that contain the search word(s), it informs you of how many there are. You can display the reference list of verses in a search buffer. A screen dump allows you to print out the list.

For example, the word *judge* appears in 170 verses. To search the entire Bible for this information and print out the list of verses took less than three minutes. Pressing f3 displays the first verse that contains the search words. Press f3 repeatedly to bring up more verses with matching words.

Bible Search utilizes a compressed database composed of eight relative (REL) files. It has the complete text of the King James Version of the Bible and an exhaustive English concordance of 12,800 words and 700,000 indexed verses. A single-disk word search takes five seconds. Miller has noted a worst-case word-search time, using the 1541, of two minutes for the whole Bible. This is believable, judging by our experience.

This program will run on several hardware configurations. The 128 version of *Bible Search* 3.1 supports REU and has an 80-column screen option. It is Fast Load/JiffyDOS compatible, although they aren't really needed. *Bible Search* 3.5 (not reviewed) is available for the 1581 and hard drives. This version reputedly can search the entire Bible in five seconds. We ran the program on our 64 with two FSD Excelerator Plus drives and a Star NX-1000 printer with MW350 interface in Commodore emulate mode. The two drives made the program quite comfortable to use, but with the various drive configurations it offers, *Bible Search* provides a good excuse to buy more hardware.

Generally, churches, Bible study groups, and Bible scholars don't have much money. Miller himself says that students for whom money is no concern should equip themselves with a PC and the IBM version of his program. For many people this is not a viable alternative. For them, the 64 version of *Bible Search* is a handy tool. It's fast, thorough, and easy to use. In fact, for some people, it would be worthwhile to buy a 64 just to run this program. Use it for Bible trivia quizzes. Print out passages of scripture to be highlighted, picked apart, crisscrossed, and written on. With a word processor's special fonts, you can print out cards or posters of your favorite Bible quotes.

The manual is clear and well written. It even has a glossary that includes the definition of *SOGWAP*. Like many programs, *Bible Search* suggests you make and use a backup copy. A reasonably good copy program is included. Because of their size, however, the cross-reference disks cannot be copied on a 1541. There is a warning to this effect—but the suggestion to copy disks is on page 3, and the warning about the reference disks is buried on page 18.

We found only two other problems with the program. You have to pound Run/Stop–Restore to get a response (its function is to reset the program to the first

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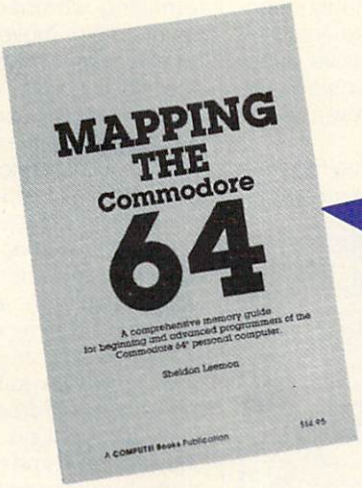
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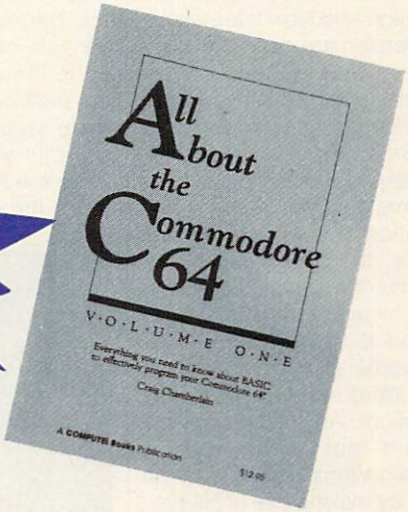
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menu). And where is the Revised Standard Version of the Bible? The King James Version and New International Version are currently available; a Revised Standard Version would be a welcome addition to this series.

Bible Search is one of those programs so deceptively simple to use that its sophistication is overlooked. You have to think about the scope of what you're searching to appreciate just how good this program is. Michael Miller has transcribed the Word of God onto a new medium. As a Christian, he could not have spread God's Word better than he has by making use of his programming talents this way. Bible students, Christian or not, can be thankful he did.

Oh, yes. Our Bible references? "The apple of his eye" is found in Zechariah 2:8 and in Deuteronomy 32:10. "Escaped with the skin of my teeth" is from Job 19:20, and "Let all the people say, 'Amen' " is from Psalms 106:48.

DAVE and ROBIN MINNICK

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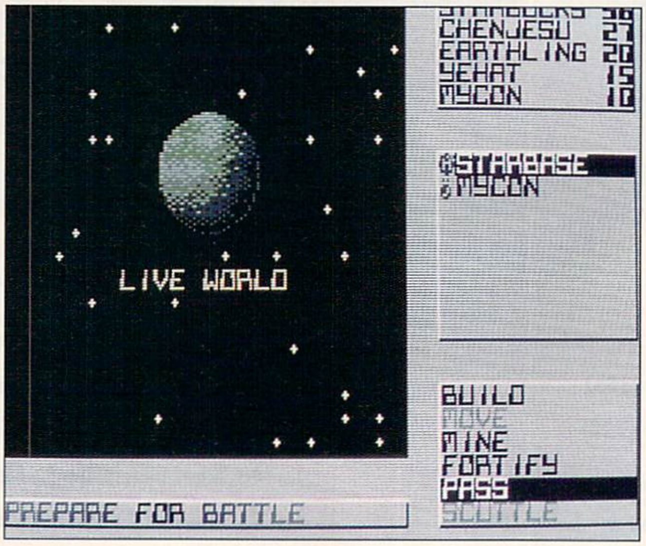
STAR CONTROL

The time: the twenty-seventh century. The place: outer space. The Ur-Quan Hierarchy, a confederation of intergalactic slave traders, is on a deadly rampage.

Held at bay for centuries by the Alliance of Free Stars, the Hierarchy is now on the verge of grinding the Alliance into space dust. Earth, formerly judged too weak to be part of the Alliance, is called upon for assistance in stemming the tide of the Ur-Quan menace. Is it a case of too little too late, or will the Alliance's newest member be up to the challenge? Blending strategic elements with arcade-style action, *Star Control* pits you (commanding either the Alliance's or Hierarchy's forces) against a human or computer opponent in a fight for control of the other's star base. Initially, it's difficult to coordinate both strategic and combat elements, but you can have the computer do the thinking or fight the battles for you.



Star Control *is an outer space blend of strategy and action.*

From your Fleet Command View—a gridlike, planet-filled screen—you and your adversary send ships out from your star bases. Your objectives are to develop colonies, build mines and fortifications, and attack the enemy or defend yourself.

All of the four Alliance and four Hierarchy races fly their own distinctive aircraft, each with unique weaponry, special powers, maneuvering characteristics, and weaknesses. The Earthling Cruiser, for example, fires heat-seeking tactical nuclear weapons and, for its special power, has a primarily defensive laser that also acts as a short-range offensive weapon. On the downside, the Cruiser is both slow and vulnerable.

Each player may operate one fleet of seven ships. These may be replaced as long as there is money to pay for them. The prices of spacecraft vary, so deciding whether to buy a less expensive but weaker ship immediately or risk possible annihilation while waiting for the cash to purchase the best is a strategic choice.

Colonies, mines, and fortifications, though equally important, provide different benefits. Colonies are recruiting areas for new members and quick routes for ship movement. Mine production earns you star bucks, which may be spent at the star base to purchase new ships. Fortifications make it difficult for your opposition to destroy your mines and colonies and reach your strategically important star base.

Because you can perform only three actions per turn, determining whether to construct a ship, move a piece, build a mine or fortification, develop a colony, or attack an enemy requires an accurate reading of the situation. To further complicate matters, you can't build on or develop some planets.

After a player has completed a turn and has placed a ship on one or more planets containing enemy craft, the screen shifts from the Fleet Command View to the Combat Transition Screen. In this mode all opposing ships occupying the same sector go at each other until a victor emerges.

Most combat screens consist of a star-laden canvas occupied by a pair of ships. Two gauges—one measuring crew strength and the other fuel usage—fill the bottom quarter of the screen. Your crew is depleted with every hit you take; however, it's possible to recruit new members. Fuel is expended by firing weapons or by using special powers and is replenished when your ship stops moving. Unfortunately, the more you stand still, the more vulnerable you are.

At first there are no pushovers among the competition, so you'll need to build to the challenge slowly. For this reason it's best to begin in the practice mode and in the easiest of three difficulty levels. Without having to worry about the strategy required in the full game, you can set your mind to inflicting destruction on enemy spacecraft.

When you've tired of practicing, you may engage in a melee with the enemy fleet. This pits your four ships against your adversary's four, one pair at a time. The

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winner of each dogfight continues against another from the loser's roster until one side has eliminated all opposing vessels.

Though fast moving and exciting, the battle sequences are a throwback to the early days of electronic gaming. In fact, the graphics, animation, joystick control, and play action are reminiscent of that venerable videogame antique *Asteroids*—except now asteroids shoot back.

Graphically, the strategic screen is less sophisticated than the combat screen. Star bases, ships, mines, and the like are represented by simple, two-dimensional shapes. Stars are represented by simple dots.

Documentation consists of a 30-page illustrated manual that does a good job of setting forth the rules and describing the races of participants and their spacecraft.

As a solo contest, *Star Control* is a disappointment. Even with the difficulty settings favoring the computer, you'll soon find it relatively easy to outwit and outfight it. The game shines in the two-player mode, where equals can battle it out or mismatched opponents can balance the odds by playing at different difficulty settings.

The bad news about *Star Control* is that it has little to offer anyone looking for something new or original. The good news about it is that players who like an outer space setting, a capture-the-flag-style challenge, and an emphasis on action and strategy will not be disappointed.

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DRAGONS OF FLAME

Imagine an Advanced Dungeons & Dragons session coming to life on the computer screen, and you'll have *Dragons of Flame*. It's an exciting combination of magic and might.

Strategic Simulations' role-playing epics in the gold boxes take a traditional approach to role-playing games (RPGs). They present an overhead view of the landscape and a side view of the action during combat. Silver box action games, such as *Dragons of Flame*, rely heavily on arcade combat in addition to the skills, magic, and monsters found in other RPGs.

Unlike its predecessor, *Heroes of the Lance, Dragons of Flame* is not too difficult and, as a result, is a lot more enjoyable. Other features and changes make *Dragons* the better of the two and an example for the future.

The appeal of *Dragons* and *Heroes* is the quick action found in both games. When you play AD & D on paper, there is no way to see the results of slaying a giant spider or defeating a hobgoblin. The gold box AD & D games show combat, but it's not controlled by a joystick. *Dragons* brings to life the imagined action and adds a lot of neat elements to round out the adventure. This is no arcade game, and you'll have the large amount of time spent solving the game as proof.

The goal of *Dragons* is to rescue a number of slaves held by the evil Draconians in the fortress of Pax Tharkas. Along the way, you'll befriend the elves of Qualinesti and travel through the wilderness and caves of Sla-Mori. This game is based on the second AD & D Dragonlance game module and reflects the thought and preparation that goes into these modules. The wilderness maze is large and keeps you from reaching the fortress and caves. Many challenges await before you must tackle the maze, so don't feel lost if you don't find it immediately.

More than half of the screen is filled by the action window. It can show either the wilderness view or combat view. The overhead wilderness view depicts your immediate surroundings and helps to guide you through the landscape. This view is new to *Dragons*.

When enemies draw near, it's necessary to switch to the combat view. You view combat from the side and only see the leader of your party and the opponent. Using the joystick and the keyboard for spells, you battle it out with the monster. This is the fun part of the game. It's very rewarding to take out a monster and watch it disappear after a few well-placed blows. It makes all those years spent playing arcade games worthwhile.

The other parts of the game screen are a collection of icons for up to ten members of your party and a compass rose that indicates the party's current orientation. The icons indicate player status and damage. You can rearrange the party at any time except during battles. Rearranging your party becomes necessary at times because only certain characters have the abilities, skills, or magic to defeat particular monsters. You have to exercise your brainpower to decide on the proper leader, but these decisions in real-time are exactly what would happen if the AD & D world actually came to life.

You use the joystick to move the party icon around the landscape or to fight battles. The space bar activates other options and commands, such as Take, Drop, Open, Shut, and Save Game. It takes no time at all to learn the game system. The game relies heavily on how quickly you can make decisions, win battles, and complete miniquests. *Dragons* will send you to many locations to look for special objects and weapons. Major goals reveal themselves at the appropriate time.

Graphics in *Dragons* are very nice, particularly in the combat view. This side view shows a lot of detail, both indoors and outdoors. The monsters move well, although a lot of them are the same size as your party leader. The wilderness view accurately reflects the overall map found on the back of the game manual. You won't need this view for much more than orientation. The animation of the monsters and characters is smooth. You'll need to move quickly to defeat your opponents.

Sounds and music are not extensive in *Dragons*, but they keep the atmosphere of the game ominous. After seeing this game on more powerful computers, I was surprised with the power that the designers pulled out of the 64. SSI does the machine justice.

Once again, SSI's manual in *Dragons* serves as an example of fine documentation. Unlike other AD & D computer games, there is not a lot to read. The bulk of the manual is for background information and character descriptions. Game commands and controls are on a quick-start card. The end re-

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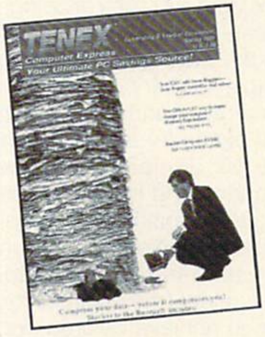

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sult is that you'll be playing *Dragons* shortly after you open the package, and the blend of action and adventure will make you forget about your pen-and-paper AD & D sessions. *Dragons of Flame* takes the spirit of AD & D adventures and the action of imaginative battles and colorfully blends them on your computer's screen.

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CENTAURI ALLIANCE

As a member of the rebel coalition, you must complete a series of dangerous missions in *Centauri Alliance.* Michael Cranford, designer of *Bard's Tale,* has set this role-playing adventure in the Star Wars–like world of the twenty-third century. Missions entail journeying to various planets, where you will negotiate mazes, combat menacing aliens, encounter deadly traps, and locate valuable items.

You assemble a party of eight individuals from six races of beings. Friendly aliens and mechanoids you meet along the way may also join your party. Characters differ not only racially but in terms of their attributes (strength and IQ, for example) and disciplines.

The four disciplines are an expertise in weapons and fighting, skills in maintaining and repairing biological and mechanical systems, metamorphic ability (being able to change shapes), and psionic talent (the ability to focus brain waves to achieve desired ends).

Most interesting are the over 80 psionic skills. Some are as simple as being able to slow down an opponent. Others are more exotic, such as encasing enemy forces in shifting sheets of rubble or bringing on earthquakes that affect only your adversaries.

No single race is competent in all four disciplines. Donsai, for instance, are capable warriors; Praktors are the only beings able to change shape. As a result of this specialization, it is essential that you assemble a well-balanced team, if you hope to succeed.

Initially, a character is skilled in one aspect of a single discipline. For example, a warrior might be adept at hurling weapons or using explosives but not at close-quarter fighting in a melee. Only by gaining experience can a character become trained in other disciplines.

Gameplay is made easy by a series of menus accessed via joystick, keyboard, or mouse. The game's combat system is also uncomplicated—if uninspired. A single figure representing your party and one or more enemy figures are placed on a small hex grid. From this position you can attack, move to an adjoining space, or flee. Before attacking, you may command individuals to engage in a melee, fire a weapon, dodge, or use psionic or metamorphic powers. After all options are chosen, the message screen displays the results of the battle.

You travel through and view your surroundings in either the first-person perspective, 3-D mode, or from overhead. Although the 3-D perspective is more attractive, the top view is more practical. It provides a better overall sense of your location and includes an automapping feature. Unfortunately, when you move to another maze, the program does not retain your previous map for later use. Fortunately, you can save a game in progress.

Centauri Alliance comes on three double-sided disks, so players will spend dozens of hours with the game. Less worthwhile is the time spent waiting for each battle to load. Use these occasions to study the lengthy manual and field guide, which do a good job of providing atmosphere and explaining the rules. The manual itself is an entertaining addition to this software package.

Before long, some players will grow tired of searching rooms, traveling between planets, increasing weaponry, and fighting battles. Diehard fans of role-playing games, however, will consider *Centauri Alliance* a solid addition to their software libraries.

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FEEDBACK

Questions and answers about previous programs, printer ribbons, and more

Bug-Swatter

SpeedScript users who've been editing their dictionaries with the *SPEEDCHECK.DM* program have been seeing SYNTAX ERROR IN 260. The problem is the part of program line 260 which follows the colon and looks like this:

```
IFSTORFTHENRETURN
```

Commodore BASIC tries to make sense of it with the interpretation

```
IF S TO RF THEN RETURN
```

Since this statement is meaningless in BASIC it results in a SYNTAX ERROR. It's a textbook illustration of the danger of running together the elements of a BASIC instruction, even though the 64 and 128 allow you to do so. The actual logic should read:

```
IF ST OR F THEN RETURN
```

To make the correction, just load *SPEEDCHECK.DM* like any other BASIC program, list line 260, make the change above by adding spaces, and save the program back again. If you have any uncertainty about how to do any of these steps, either experiment with a copy of the *SpeedScript* disk or ask someone who is certain.

Several readers have written to complain that William Chin's *Memo Card* program (September 1989 and the 1991 *Gazette PowerPak* disk) will not reload data from disk without an occasional STRING TOO LONG ERROR appearing. The problem can easily be fixed by replacing line 1350 in the *Memo Card* BASIC program with the following and adding some additional code.

```
1350 INPUT#1,HR
1352 FOR I=0 TO HR:T$=“ ”
1354 GET#1,A$:IF A$=CHR$(13)
  THEN 1358
1356 T$=T$+A$:GOTO 1354
1358 IF T$=“←”THENT$=“ ”
1359 MS$(I)=T$
```

I would like to commend the author of *CoilCalc*, which ran in the June 1991 issue. It is a fine program that will be of interest to many electronic hobbyists. However, the program will not function in Option 1 because of errors in lines 580 and 585. Here are the corrections that should fix the problem.

```
580 IN=INT(100*((.5+VAL(CD$))
  ↑2)*((TN(GA)*VAL(CL))↑2))
585 IN+INT(IN/((4.5*VAL(CD$))+
  (10*VAL(CL$))))
```

ROLAND BURGAN
HANCOCK, MI

More Niche Programs

Robert Marcus' *CoilCalc* (June 1991) is one of the best and most useful programs you've published in years. In the user group of which I am a member (and "stuckee" called the president), a substantial percentage of members are radio amateurs, technicians, or engineers. Many of us are photographers, pilots, rebuilders of elderly automobiles, model airplane flyers, chemists, and otherwise technically interested in the world around us. How about some more niche programs of interest to any or all of the above?

B. CHANDLER SHAW (WA6EWY)
GRANADA HILLS, CA

We'll be happy to consider such programs. So how about it, readers? Do you use your 64 with some hobby or avocation? If you've written a program that helps you get more enjoyment out of some other activity, send a copy of it with instructions on disk to the Gazette Submissions Reviewer for possible publication. We pay for programs we publish.

Graphs Wanted

There is a program called *128 Graph Designer* written by Danny Komaromi in the July 1987 issue. I would like to see it written for the 64.

RUSSELL WRIGHT
MILWAUKEE, WI

128 Graph Designer *is a good program that lets users create pie charts, bar graphs, and line charts on the 128, but there is no 64 version. If a bar chart will fill your need, Tim Ruiz wrote a program called* EZ Bar Charter *(September 1989) that works with either the 64 or 128. It plots up to eight items on a vertical bar chart and prints the resulting graph to screen or printer. If someone would like to submit a good chart program for the 64, we'll consider it for publication.*

Printer Ribbons

Where can I obtain ribbons for my VIC 1525 printer? I understand the printer is no longer made.

DON SYWASSINK
SIERRA VISTA, AZ

Try Ramco Computer Supplies, P.O. Box 475, Manteno, Illinois 60950; (800) 522-6922. Canadian readers can call (800) 621-5444. Ramco has them in stock, but call for the latest prices and shipping information.

Printer Plug Revisited

In July's "Feedback" Bob Chalfant said he was looking for a 36-pin plug so he could print documents in Epson mode with his SR 2000 Dual Interface printer. Radio Shack stocks a connector that they apparently use for their own printers. It might work. It's called a 36-Position Male Printer Connector and the catalog number is 276-1533.

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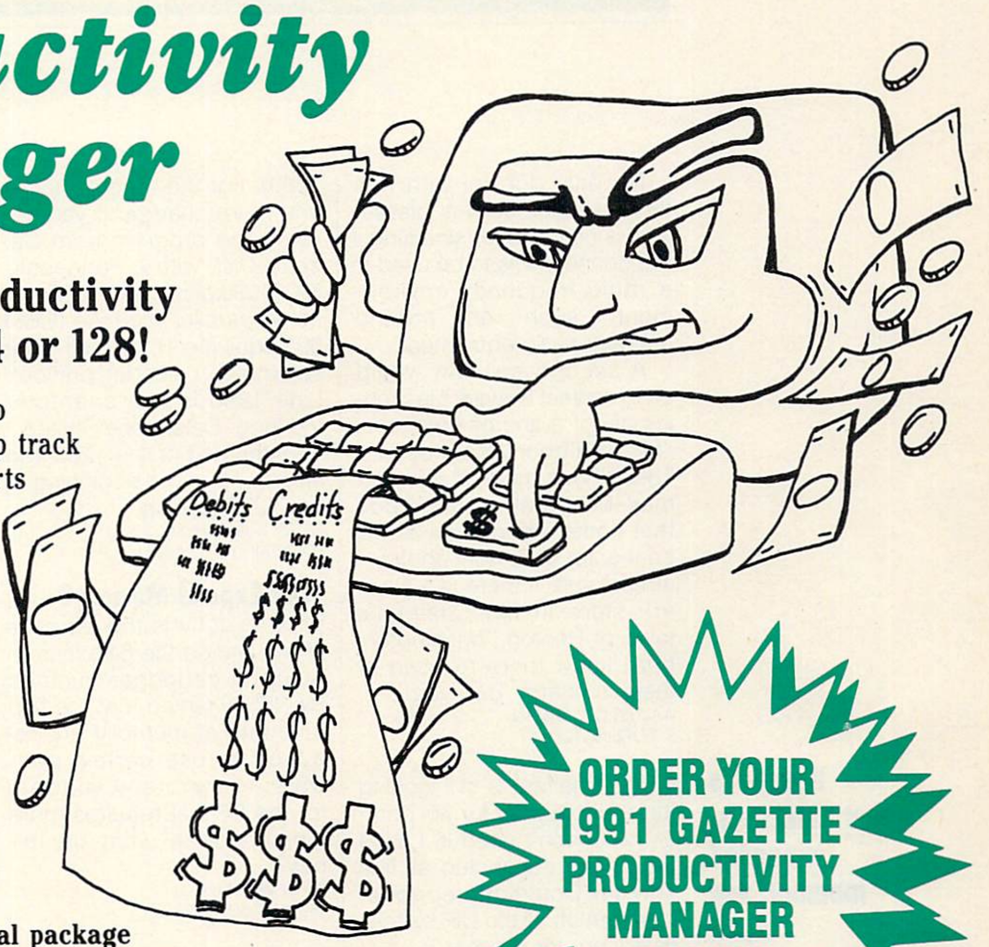

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FEEDBACK

My only quarrel with it is that the back shell is plastic. This is no good for shielding if the connector is to be used in a radio frequency environment, such as around amateur radio equipment.

A second solution would be to contact Newark Electronics about a line of Amphenol "Micro-Ribbon" connectors. These have metal shells and may be obtained in styles that come straight out of the connector or at right angles. I am not sure if there is a Newark store in Mr. Chalfant's town of Renton, Washington, but I know there are two of them in nearby Bellevue.

WALTER C. WARMAN
S. BURLINGTON, VT

Questions about calendars, expanded memory, and static

If Bob Chalfant is still looking for a 36-pin plug for his printer, he doesn't need it. Leave the printer connected as it is now for Commodore mode, then turn off all the DIP switches except for number 8.

This works because the necessary interface is already built into the printer and it would be the same as connecting a serial cable to an interface, then running a 36-pin cable to the printer.

In my opinion the SR 2000 is one of the best 9-pin dot matrix printers available because of this dual interface. If some utility program requires a Commodore printer, you can change back by turning on DIP switches 3, 6, and 8. Any time you change the DIP switches, you must turn the printer off and on again for the changes to take effect, otherwise the printer will continue to operate in whatever mode it was in before you changed them.

JACK STANTON
MARTINEZ LAKE, AZ.

More Calendar Comments

Apparently Gazette's most famous lament has become *Monthly Calendar* (March 1989). For the record, here's one more change. If you are using the program from *Gazette Disk* with a Panasonic KX-P1090 printer with a PPI serial to parallel interface (CBM 801 equivalent), you will get a scrambled calendar printout. Line 1280 is one character too long. Delete one Shifted * from the end of line 1280 and insert one at the beginning of line 1290's string.

PETER KUBISCHTAL
FOUNTAIN VALLEY, CA

Why Expand Memory?

What exactly is the purpose of expanding the 64's memory, using cartridges such as the 1750? On an IBM, certain amounts of memory are required to use certain software. Is there any software for the 64 that requires more memory than what the 64 has?

JOHN VEILLEUX
ORRINGTON, ME

There's no software that we know of that requires a 64 to have more memory than was built into it. On the other hand, several software packages, such as GEOS, can make use of RAM expansion if it's available. And many programs—games particularly—use the disk drive for virtual storage when either the program or its data is too large to be loaded and maintained in memory all at one time.

Games are one example of why more memory is better, but here are some others. Business applications can use larger spreadsheets and data bases. Programmers can write larger programs which allow for more highly-developed code and more sophisticated interpreters or compilers.

Extra memory can help graphics when several scenes must reside in memory at once for smooth screen updates. A computer can do great things with digitized sound, but a lot of storage space is needed to contain reasonable sound samples

Where speed isn't a critical factor, disk drives are a practical means of extending the 64's 64K limit. But where speed and quick responses are needed, more memory is very handy indeed.

Monitor Static

I've noticed that whenever I put my hand near the screen of my 1701 monitor I can feel the hairs on the back of my hand stand up. Is this something I should be worried about?

GEORGE W. BLACK
ATLANTA, GA

What you feel helps your monitor's screen to glow, but it won't induce the same effect in humans. You're feeling static electricity, a natural phenomenon produced on every monitor. You can also feel the same tingling sensation by touching the back of your hand to a television screen. An electron tube in a TV or monitor fires a beams of electrons at the screen which causes portions of it light up, producing the image you see. This process causes a static electric charge to build up on the screen and this charge acts like a magnet, either attracting or repelling the hairs on your arm. It won't harm you, but static electricity can damage semiconductor materials. That's why it's a good idea to touch something metal to drain away the charge before you touch any computer chips or components.

If you have a question, comment, or problem, we want to hear from you. Send your letters to Gazette Feedback, COMPUTE Publications, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408. ❒

MACHINE LANGUAGE

Jim Butterfield

SIX COMMANDS ARE KEYS TO INPUT/OUTPUT

Input and output are easy from BASIC—the authors of BASIC made it that way. Trying to comprehend them in machine language, however, can make a grown programmer cry.

It doesn't have to be that hard. Commodore made it confusing by including several Kernal jump locations that are generally only used by the Kernal itself—calls like UNTALK and UNLISTEN. Most programmers could code for a career and never use them. Why? Because you can do almost all your ML input and output with just six Kernal calls. You might need a little help from the BASIC language, which is always in place on the 8-bit machines; but it's not hard to learn six system calls. The programmers' manuals often list dozens of calls, but most of them are rarely needed. That's confusing to a beginner. CHROUT or BSOUT ($FFD2) sends a character to the output stream. GETIN ($FFE4) gets a character from the input stream. STOP ($FFE1) scans the Run/Stop key. CHKIN ($FFC6) switches the input stream to a logical file. CHKOUT or CKOUT ($FFC9) switches the output stream. CLRCHN or CLRCH ($FFCC) restores input/output streams to defaults.

Mnemonics vary among the manuals, but the routines' locations—and their jobs—are the same for all Commodore 8-bit machines. You'll even find them on the original PET computer from clear back in 1977.

To use these call addresses, all you need to do is set up any needed registers and then make the call with a JSR instruction. Some of these calls destroy the contents of your registers; you'll need to know about this and preserve the register contents if you need to use them later.

To output a character, load the ASCII character code into the A register, and JSR $FFD2. The character will go to the output stream (the screen, if you haven't changed things by using $FFC9). All three data registers (A, X, and Y) have their values preserved.

To get an ASCII character into the A register from the input stream, use JSR $FFE4. If you haven't changed the input stream (with $FFC6), the character will come from the keyboard input buffer. This call will not wait; it always returns immediately. If there's no character available (often the case when you're reading the keyboard), A will contain a value of binary 0. When reading data files (with the input stream switched via $FFC6), system call $FFCF, CHRIN, performs an identical action to that of GETIN. All three data registers may have their contents changed by this call. Save these values to memory if you will need them.

To check Run/Stop, use $FFE1. If the Run/Stop key is being pressed at this instant, the call will return with the Z flag set. A BEQ (Branch EQual) instruction allows you to take appropriate action, such as stopping the program. A machine language program will not respond to a press of the Run/Stop key unless you include calls to $FFE1 in your code. The contents of registers A and X will be affected by this call. You'll find that register A contains information about a few other important keys.

Switch your computer's input/output streams with $FFC6 and $FFC9. Load the logical file number into the X register, and then call $FFC6 to switch the input stream or $FFC9 to switch the output stream. The stream should be restored to its default later by means of a call to $FFCC. The logical file number means that the file should previously have been opened; this may be done from machine language, but you'll find that it's often easier to use the BASIC OPEN command.

Once the file is open, you may switch the input or output stream to it as many times as you wish.

When you're finished with the file, you must always remember to close it. If you have both input and output streams switched at the same time, it would cause confusion on the serial bus. All three data registers may be changed by this call. Save their contents in memory if you expect to need them later.

Manuals list dozens of machine language calls, but you can handle most input and output requirements with six Kernal calls.

Restore default input/output streams with $FFCC. This command sets the input stream to the keyboard input buffer and the output stream to the screen. It takes care of all necessary cleanup work. For example, devices on the serial bus may be told to untalk or unlisten. Registers A and X will be affected by this call.

To demonstrate how this procedure operates, here's a short program to enter that accepts input characters from the keyboard and then processes them. If you tap the B key, the letter A will print, tap the C key and B will print, and so on. A will transform to Z.

```
GO     JSR   $FFE4
       CMP   #$41
       BNE   NEXT
       LDA   #$5B
NEXT   BCC   PASS
       SBC   #$01
PASS   JSR   $FFD2
       CMP   #$0D
       BNE   GO
       RTS
```

❐

BEGINNER BASIC

Larry Cotton

CRASHPROOF DATA ENTRY PART 2

Last month we started working on a way to make the most user-friendly programs ever written. This subroutine would let computer novices enter data into your programs without a chance of their crashing them or being presented with a cryptic REDO FROM START.

Continuing with the crashproof program, let's have another look at line 150.

```
150 IFA$<CHR$(32)ORA$>
   CHR$(95)ORA$=CHR$(34)
   THEN120
```

Make your programs so friendly that even beginners can input data without strife or hassle.

We want to restrict the user's input to numbers, letters and certain punctuation. The above line will do just that. Here's how to analyze what it will and will not accept.

Refer either to your computer's *User's Guide* or *Programmer's Reference Guide* for an ASCII and CHR$ Code chart. This list shows what characters will show on your TV or monitor screen if you type PRINT CHR$(X), for most of the values of X from 0 to 255.

Conversely, the list also shows the values which would be obtained by typing PRINT ASC("X"), where X is any keyboard character. Type in a few examples of each in immediate mode.

As mentioned last month, each character has a unique ASCII value. The ASCII value of *E*, for instance, is 69.

GET A$ in line 120 waits for user input. If he or she types *E*, A$ could be thought of as either *E* or CHR$(69); likewise *6* can be treated as either *6* or CHR$(54).

ASCII values 32–47 and 58–64 print a space and most of the punctuation. Values 48–57 print the numbers, while 65–90 cover the capitalized alphabet. You could cut it off there, but I included five more printable characters with ASCII values 91–95.

The symbols < (less than) and > (greater than) are usually used to compare numeric values; for example, IF A < 5 THEN . . . means if the value of A is less than five, then some action is taken. You can also use < and > to compare strings' CHR$ values.

Thus IFA$ < CHR$(32) OR A$ > CHR$(95) THEN 120 means if the ASCII value of the entered character is less than 32 or greater than 95, then program control jumps back to line 120 for another GET. If the value falls in the range 32–95, the character will be accepted, and control will fall to the next line.

We don't want the cursor to move if the user enters a quotation mark, thus the statement ORA$=CHR$(34) near the end of line 150. The routine will accept apostrophes.

Also, we don't want the cursor to move if the first character entered on a line is a space, so we add this line:

```
160 IFA$=CHR$(32)THENIFL=0
   THEN120
```

L is line length, which is set to zero in line 100—the cursor appears in the leftmost screen position. If it's there when the space bar is pressed, program control just goes back for another GET. If the ASCII value of the entered character falls within the range 33–95, inclusive, control passes to the next line.

```
170 PRINTD$A$;:B$=B$+A$:L=L+1:
   IFL=80THENPRINTCHR$(32);:
   GOTO190
```

This rather long BASIC line first deletes the cursor, then prints the entered character with PRINTD$A$. Note the semicolon, which keeps the printed information on the same line.

B$ will be the sum of all the individual A$s until the Return key is pressed. It starts out life as nothing, then begins lengthening as the A$ characters are added. L increments by 1 as the line gets longer. The IF-THEN tests for an arbitrary maximum line length of 80 characters (two screen-width lines). If L becomes 80, a space is printed and control is passed to a line which waits for either the Return or Del key to be pressed.

After the character is printed to the screen, we want to advance the cursor one position to the right and wait for another character to be typed. Go back to line 110.

```
180 GOTO110
```

The next line was called from line 170. Two full screen lines have been entered without a press of the Return key; L is 80. The only two things we want the user to press are the Return key itself or the Del key.

```
190 GETA$:IFA$< >R$AND
   A$< >D$THEN190
```

This line will loop indefinitely until one of the above-mentioned keys is pressed, in which case control passes to the next line:

```
200 IFA$=D$THENGOSUB210:
   GOTO110
```

Pay close attention now. If the Del key is pressed (defined in line 20 as D$), we call a subroutine to take the necessary action.

If the Return key is pressed (A$=R$), control just falls through to line 210 or 220, which then becomes the end of the subroutine called in line 30.

The last two lines are the

subroutine for pressing the Del key.

```
210 IFL=0THENPRINTD$;:RETURN
220 PRINTD$A$;:L=L- 1:B$=LEFT$(B$,L)
   :RETURN
```

The first line checks to see if L=0. If so, the cursor is at its beginning position, it's deleted, and control returns to 110.

If L is anything but zero, line 220 kicks in, prints two deletes and decrements L. B$ becomes the L-length left end of B$ and control returns to line 110 (sent there by line 140 or 200).

Try running the program now. A nonblinking horizontal-line cursor will greet you. Try typing anything, randomly, as fast as possible, including spaces, deletes, and so on. Just don't press the Shift Lock key. After typing several characters, press Return.

Then, in immediate mode, type PRINT X$. You should see an exact clone of the originally input characters. X$ is the input string, with which you may do as you wish.

Remember, any key repeats. The routine accepts all capital letters, all numbers, and most punctuation except double quotes. It will not accept lower case letters, cursor control characters, and so forth. Once you've hit Return, there's no going back. ❐

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PROGRAMMER'S PAGE

Randy Thompson

SYS CALLS, UNTIMELY BUGS, AND MORE

Towering stacks of "Programmer's Page" submissions are taking over my computer room. It must be time for another column of reader tips (cleaning my room wouldn't hurt, either).

SYS 128

SYS calls such as the ones below are an important addition to any programmer's bag of tricks. The following are specific to the Commodore 128.

Here are some tips from readers about 128 SYS calls, the midnight bug, and more.

SYS Command	Function
SYS 42977	Calls the ARE YOU SURE? message and returns the ASCII code of the key pressed in the accumulator
SYS 57416	Goes directly to 64 mode (does not collect $200)
SYS 51069	Cancels quote mode and reverse mode
SYS 51328	Switches to lowercase mode
SYS 51346	Switches to uppercase mode
SYS 51598	Rings bell
SYS 50341,,*x*	Clears screen line *x* (0–24)
SYS 51794	Clears the current screen line
SYS 51830	Clears from cursor to the end of the line
SYS 51851	Clears from the start of the line to the cursor
SYS 51871	Clears from the cursor to the end of the screen
SYS 51900	Scrolls the screen up one line
SYS 51954	Enables block cursor
SYS 51966	Enables underline cursor

ROD BENNETT
BALTIMORE, MD

Strange Swap

Here's a trick that's sure to make you think—think about how it works, that is. It's an unusual way to swap the values of two variables, something that's quite common in sorting algorithms. What's unique about this method is that it doesn't use a third variable. It uses the XOR function instead. Here's how the swap works in BASIC 7.0 on a 128:

```
10 INPUT "A = ";A
20 INPUT "B = ";B
30 A = A XOR(A,B)
40 B = A XOR(A,B)
50 A = A XOR(A,B)
60 PRINT "A = ";A
70 PRINT "B = ";B
```

Since the 64 lacks an exclusive OR (XOR) function, here's how the program can be entered on that computer:

```
10 INPUT "A = ";A
20 INPUT "B = ";B
30 A=(A OR B) AND NOT(A AND B)
40 B=(A OR B) AND NOT(A AND B)
50 A=(A OR B) AND NOT(A AND B)
60 PRINT "A = ";A
70 PRINT "B = ";B
```

This program takes advantage of the fact that (A OR B) AND NOT(A AND B) produces the same result as A XOR B.

MARK LINTON
BALTIMORE, MD

What Time Is It?

Shortly after completing August's column, I received a letter that further explains the inconvenient CIA chip midnight bug documented in that column. This letter, sent by Anthony Garza of Creative Specialties, has been edited slightly for size:

As you know, the 64 contains two 6526 CIA chips, each having an independent TOD clock. Each clock's hour register has an a.m./p.m. flag that's controlled by bit 7. You clear bit 7 when it's a.m. and set bit 7 when it's p.m. When setting one of the hour registers, I noticed that bit 7 is reversed whenever you select a time within the hour of 12:00. A simple cure for this is to set the a.m./p.m. flag to the incorrect value when choosing times between 11:59 and 1:00. For example, if you set the time to 12:47 p.m., you must set the hour register to a decimal 18 (that's 12 in binary coded decimal) instead of 146 (18 + 128). Interestingly, if you read the hour register after setting it to 18, the CIA chip returns the desired value of 146! This a.m./p.m. flag reversal occurs only during the hour of 12:00.

I thought that this quirk in the TOD chip might be a problem with my 64, but the a.m./p.m. bug occurs on a backup 64 that I use as well as seven other machines that belong to some of my friends and associates. Programmers should add this information to their *Commodore 64 Programmer's Reference Guide*, since it's not mentioned in that book or in any other book that I can find.

Thanks for all the great tips, guys. It's always a pleasure to share such useful information as this with our readers.

"Programmer's Page" is interested in your programming tips and tricks. Send all submissions to Programmer's Page, COMPUTE's Gazette, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408. We pay $25–$50 for each tip we use. ❒

GEOS

Steve Vander Ark

FIGHTING THE JAGGIES

A friend of mine recently commented that he could spot a *GEOS* document a mile away. With those blocky fonts, he jeered, there wasn't one yet he'd care to use for his own correspondence.

As a bona fide *GEOS* fanatic, I felt compelled to impart a little of the gospel according to Berkeley, to share with him the delight one can experience from a proportional font coming off a 9-pin printer.

A 9-pin printer is capable of some truly remarkable printouts. Then why is it necessary for *GEOS* to use such a jaggy print routine?

The *GEOS* system does all its work, whether graphics or text, on an internal hi-res "screen" in RAM. This bitmapped image is larger than the screen displayed by *geoPaint* or *geoWrite;* the only way to see it all is with a preview option. The printer routine puts a dot on the page wherever there was one on this internal screen, producing a faithful dot-for-dot image of what was created with the application.

Two factors affect the resulting printout from any application: the printer doing the printing and the software telling it how to do it. A laser printer can print astoundingly clear images, but it will still have the jaggies unless you use one of the ten or so *GEOS* laser fonts. A 24-pin printer has built-in fonts as crisp and clean as any you'll see from a daisywheel printer or fancy typewriter, but *GEOS* can't use them. Your best bet, actually, is still a 9-pin Epson-compatible dot-matrix printer, using a new ribbon for nice dark printing. The rest of the responsibility then lies with the software. In *GEOS*'s case, the job is assigned to printer drivers.

Perhaps an explanation is in order as to what drivers really do. The world of computers has never settled on a standard way of doing things in the way that video recorders have pretty much settled on VHS. Each device comes preset with its own set of codes and commands for operation; each piece of software has to know them all if it wants to communicate with all these different devices. This is true of hard drives, light pens, and printers. The code one printer uses to initialize itself might switch on the boldface option for another model.

GEOS was designed to be as generic as possible, whether you use an Okidata or an Epson printer. It's up to you to customize *GEOS* with the translation routine it needs for your particular setup. Those routines are called device drivers—input drivers for light pens and joysticks, printer drivers for printers. Each driver contains the needed codes for *GEOS* to tell the device what to do. In the case of printers, it's supposed to put dots on paper wherever there are dots on the screen.

Those jaggies, which are the stairstep pattern along any diagonal line or curve in a dot-matrix printout, are the necessary product of creating lines out of individual dots. Of course, the closer the dots can be squished together, the cleaner the printout should look, but a *GEOS* screen contains dot location information for only 60 or 80 dots per inch, no more. The fancier fonts some packages offer get their slick appearance simply from having more dot data for each area of the page. Since *GEOS* has no such capability, we are out of luck.

But we can cheat. Instead of putting a dot for each screen dot and leaving it at that, we can go back over those dots with another set that's just a little bit off from where we printed on the first pass. This process will smooth out the printing by filling some of the jaggies with extra dots. Printer drivers which tell the printer to print the image more than once, each time offset by a fraction of an inch, are called multistrike drivers. There are a number of them available for *GEOS*. Most are double-strike drivers, which add one set of dots to the original set. There are also quad-strike drivers, which produce a total of four dot images, each slightly offset.

There is even a six-pass driver called EX-800 available for Epson and compatible printers. It's a program by Kevin McConnell that's available for downloading from QuantumLink and many BBSs. Its printouts are impressive, sometimes rivaling a laser printer's for clarity, especially on smaller fonts. The extra dots take a while to print, so printing time is noticeably longer.

Here are some tips to help you eliminate the jaggies from your GEOS documents.

It is also possible to turn the printing chore over to a program called *Lasermatrix,* which interprets the page as it prints it. You have to customize the basic driver with a number of technical details related to your printer for it to do the job, but the resulting printout is very clean with a minimum of jaggies.

Lasermatrix comes with an elaborate and rather technical customizer routine for use with your particular printer. The procedure takes some time and requires a careful reading of your printer manual, but the results are worth it. If you use an Epson compatible, which includes the Panasonic line, there is a *Lasermatrix* version already worked out for you. This ingenious shareware program is available on QuantumLink and on local bulletin boards. ❐

D'IVERSIONS

Fred D'Ignazio

VIRTUAL REALITY HITS THE SHOPPING MALLS

Recently I was a speaker at the National Educational Computing Conference (NECC) in Phoenix, Arizona. While at the conference, I stopped at the Commodore booth and saw the Mandala Exhibit.

Mandala is a virtual music studio, complete with several virtual (computer-synthesized) instruments that you play by whisking your hands through thin air. By making the right movements, you can play instruments that only exist on a mosaic of computer screens—and in your imagination.

I immediately saw a use for Mandala-type exhibits in the entranceways of large stores at shopping malls. There already are touchscreen kiosks inside all major department stores that tell you where to buy jewelry, china, wedding dresses, and blue jeans. A Mandala-style kiosk would go one step further. It would let you select items in the store for possible purchase, then try them on in virtual space. You could combine your image with that of anything in the store. You could try on new hats, shoes, coats, and coiffures.

Try on a new coat, a hairstyle, or even a new life at a virtual reality kiosk.

Smaller virtual-space kiosks could also be inside retail stores in the mall. Virtual dressing rooms would let customers see themselves in clothing much faster than having to enter a real room, take off old and try on new garments. There would be no more twisting and turning in front of mirrors, trying to see how a garment looks from all directions.

Virtual-reality kiosks and rooms in the mall's stores would attract customers for their novelty value and for the sheer convenience of being able to see yourself in the store's products in a fraction of the time it would normally take to try things on.

Game arcades at the mall would be revolutionized by Mandala-style videogames. The small boxes that attract kids and their quarters would be replaced by game walls where one or more players or combatants would stand, ready to be blasted into a virtual game world where they could interact with objects appearing on the game wall's picture screens.

Other kids would prefer renting bodysuits that included virtual sunglasses. These glasses would actually be tiny flat-screen computer monitors that let you see, in color and 3-D, the game world that you had paid to enter. Each time you moved in your body suit, you'd see that movement reflected in your player's position inside the computer's virtual game world. You would literally see the world through the eyes of a player inside that world!

Down the road I see Kinko's photocopying stores transformed into virtual-reality service bureaus. Who could resist the opportunity to enter a store and experience a thrilling vacation in the Himalayas or a hang-gliding journey over the Smoky Mountains or a white-water rafting expedition down the Colorado River?

These stores could shape a reality for you that is so vivid, so multisensory, so complete that you would swear you were there—where *there* could be anywhere from the driver's seat of a souped-up Ferrari to the helm of Donald Trump's yacht. You could replace J.R. on the TV soap "Dallas" and be surrounded by beautiful stars, or have Arnold Schwarzenegger's body with your head on it.

Virtual-reality copy stores would feature cut-and-paste realities that you could sample in the store; copy onto videotape, disk, or CD; and take home to show your friends.

You want to sing like Madonna, Sting, or Pavarotti? You could go to a virtual-reality copy store and create a videotape of you singing in the Houston Astrodome or the Toronto Skydome, where your stage high jinks and your favorite singer's voice would ignite a crowd of thousands.

Like the Kinko's of today, many of the virtual-reality workstations would be self-service. You could pop in a videotape, disk, or optical disc and make several virtual-reality copies. Virtual-reality copy stations could be a hit with people looking for a gift to give someone on their birthday, wedding, graduation, or other special occasion. They would also be used to create virtual-reality postcards, letters, and multimedia faxes to family and friends in distant locations. Show them the fun you're having.

Virtual-reality kiosks, arcades, and copy stores might be a hit in future malls. The only danger is that they would be too delicious and seductive ("Create a new reality in ten minutes for only $9.95!") that those people who drop in to a new virtual reality may elect to drop out of their dreary, humdrum real reality.

Chain-hopping from reality to reality may become a new social disease. Reality hoppers may eventually become as ubiquitous as today's drug addicts and panhandlers.

"Can you just spare two bucks?" pleads the wild-eyed reality hopper to a passerby in a late 1990s shopping mall. "I was on the Orient Express racing across Europe toward Istanbul, and my quarter ran out. I've got to get back on that train, man. Someone committed a murder, and only I can figure it out." ☐

SPEEDWAY

Daniel Lightner

Speedway is a *SpeedScript* file reader and disk management program. You can view any information that may be in a *SpeedScript* file while you are writing a BASIC program or even while another program is running.

Speedway also gives you access to a command window that allows you to enter disk commands or view a disk directory.

Speedway is written in machine language. To enter it, use *MLX*, our machine language entry program. See "Typing Aids" elsewhere in this section. When *MLX* prompts, respond with the following values.

Starting address: CA71
Ending address: CFB8

Be sure to save a copy of the program before exiting *MLX*.

Put It to Use

To use *Speedway,* load it with the ,8,1 extension. After it has loaded, type NEW and press Return. Then type SYS 51825 to activate the program. Right away you'll see a prompt for a *SpeedScript* file. To view a file, place the proper disk in drive 8, enter the filename, and press Return. The listing can be halted for easy reading by pressing any key. Then press any key to continue. A listing can be aborted by pressing the Run/Stop key. This will also return you to BASIC. Enter SYS 51825 to activate the program again at any time.

To activate the disk command window when the program is asking for a *SpeedScript* file, enter $ and press Return. You'll then be presented with a menu of seven commands.

1. **Directory**
2. **Scratch**
3. **Rename**
4. **Copy**
5. **Validate**
6. **Format**
7. **Quit disk**

Simply enter the number of the command. To see a directory, press 1. Should a directory have more files than can be displayed on one screen, press any key to halt the listing and press any key to restart it.

Press 2 to scratch a file. If you change your mind after making this selection, simply enter a name that doesn't exist on the disk.

The Copy and Rename commands will ask you for new and old filenames. For example, to rename COMPUET to COMPUTE, press 3, enter COMPUTE as the new name, and press Return. Enter COMPUET (the old name) and press Return again. The Copy function works in a similar manner.

The Format command will format a disk, asking first for a disk name and then an ID. If you should accidentally enter Format, Rename, or Copy, just enter an asterisk (*) at the first prompt to abort the command.

Press 6 to validate a disk in drive 8.

The Quit option will return you to the *SpeedScript* filename prompt. To abort this screen and return to BASIC, enter an asterisk and press Return.

SPEEDWAY

```
CA71:A0 00 A9 00 8D 20 D0 8D A8
CA79:21 D0 A9 93 20 D2 FF A9 38
CA81:9A 20 D2 FF 20 D0 CB 20 C2
CA89:AC CB A0 00 B9 A9 CF 20 B0
CA91:D2 FF C8 C0 0C D0 F5 20 65
CA99:BE CB 20 49 CB AD 35 03 9C
CAA1:C9 24 F0 07 C9 2A F0 09 95
CAA9:4C B3 CA 20 DE CB 4C 71 DD
CAB1:CA 60 AC 34 03 A2 00 BD FD
CAB9:B5 CF 99 35 03 EE 34 03 E3
CAC1:C8 E8 E0 05 D0 F1 CE 34 82
CAC9:03 AD 34 03 A2 35 A0 03 31
CAD1:20 BD FF A9 02 A2 08 A0 CC
CAD9:02 20 BA FF 20 C0 FF A2 76
CAE1:02 20 C6 FF 20 CF FF 20 B9
CAE9:CF FF A0 00 20 42 CB A5 C2
CAF1:CB C9 40 D0 37 20 CF FF CE
CAF9:C9 1B B0 0D 18 69 40 4C 55
CB01:0A CB C9 5B B0 0A 18 69 C6
CB09:10 C9 1F F0 17 20 D2 FF EC
CB11:20 B7 FF C9 00 D0 03 4C D8
CB19:F0 CA A2 00 20 C6 FF A9 F5
CB21:02 4C C3 FF A9 0D 20 D2 D9
CB29:FF 4C 11 CB A5 CB C9 3F E1
CB31:F0 E8 20 42 CB A5 CB C9 F9
CB39:40 F0 FA 20 42 CB 4C F0 59
CB41:CA A5 CB C9 40 D0 FA 60 59
CB49:A0 00 A9 00 8D 34 03 20 C9
CB51:E4 FF C9 00 F0 F9 C9 14 AB
CB59:F0 38 C9 0D F0 20 C9 7B 98
CB61:B0 ED C9 20 90 E9 C9 22 E9
CB69:F0 E5 C9 2C F0 E1 AC 34 8B
CB71:03 C0 14 F0 DA 20 D2 FF 49
CB79:20 89 CB 4C 50 CB AC 34 01
CB81:03 C0 00 F0 CA 4C D2 FF 07
CB89:AC 34 03 99 35 03 EE 34 46
CB91:03 60 AC 34 03 C0 01 B0 69
CB99:03 4C 50 CB 20 D2 FF 38 11
CBA1:AD 34 03 E9 01 8D 34 03 C5
CBA9:4C 50 CB A9 0D 20 D2 FF 1E
CBB1:20 D2 FF A9 12 20 D2 FF 5F
CBB9:A9 96 4C D2 FF A9 0D 20 63
CBC1:D2 FF 20 D2 FF A9 9A 20 EF
CBC9:D2 FF A9 3E 4C D2 FF A0 32
CBD1:00 B9 5B CF 20 D2 FF C8 55
CBD9:C0 4E D0 F5 60 EA A0 00 CE
CBE1:B9 8F CE 20 D2 FF C8 C9 08
CBE9:00 D0 F5 20 66 CE 20 E4 0A
CBF1:FF A5 CB C9 38 F0 1E C9 94
CBF9:3B F0 20 C9 08 F0 22 C9 1E
CC01:0B F0 28 C9 10 F0 2E C9 68
CC09:13 F0 30 C9 18 F0 03 4C E1
CC11:EF CB 4C E4 FF 20 6F CD 9A
CC19:4C DF CB 20 42 CC 4C DF 0A
CC21:CB A9 01 85 FB 20 77 CC 9F
CC29:4C DF CB A9 00 85 FB 20 23
CC31:77 CC 4C DF CB 20 F5 CC D8
CC39:4C DF CB 20 0F CD 4C DF 94
CC41:CB 20 E4 FF A9 0D 20 D2 F9
CC49:FF 20 20 CE 20 49 CB A0 3A
CC51:00 B9 51 CF 99 48 03 C8 3D
CC59:C0 03 D0 F5 A0 00 B9 35 3B
CC61:03 99 4B 03 C8 CC 34 03 61
CC69:D0 F4 18 AD 34 03 69 03 0A
CC71:8D 34 03 4C 02 CE 20 E4 74
CC79:FF A9 0D 20 D2 FF 20 3C 34
CC81:CE 20 49 CB AD 35 03 C9 82
CC89:2A F0 68 A5 FB C9 01 D0 B5
CC91:10 A0 00 B9 57 CF 99 48 6C
CC99:03 C8 C0 03 D0 F5 4C AF D5
CCA1:CC A0 00 B9 54 CF 99 48 C2
CCA9:03 C8 C0 03 D0 F5 A0 00 DE
CCB1:B9 35 03 99 4B 03 C8 CC 34
CCB9:34 03 D0 F4 AD 34 03 85 61
CCC1:FB A9 0D 20 D2 FF 20 2E 6C
CCC9:CE 20 49 CB A0 00 A6 FB 07
CCD1:A9 3D 9D 4B 03 E8 B9 35 5C
CCD9:03 9D 4B 03 E8 C8 CC 34 2E
CCE1:03 D0 F3 8A 8D 34 03 18 B3
CCE9:AD 34 03 69 03 8D 34 03 18
CCF1:4C 02 CE 60 20 E4 FF A0 47
CCF9:00 B9 4E CF 99 48 03 C8 85
CD01:C0 03 D0 F5 A0 00 A9 03 92
CD09:8D 34 03 4C 02 CE 20 E4 0E
CD11:FF A9 0D 20 D2 FF 20 4A DB
CD19:CE 20 49 CB AD 35 03 C9 1C
CD21:2A F0 D0 A0 00 B9 4B CF 7F
CD29:99 48 03 C8 C0 03 D0 F5 3A
CD31:A0 00 B9 35 03 99 4B 03 BF
CD39:C8 CC 34 03 D0 F4 AD 34 0D
CD41:03 85 FB A9 0D 20 D2 FF 68
CD49:20 58 CE 20 49 CB A6 FB A9
CD51:A9 2C 9D 4B 03 E8 A0 00 32
CD59:B9 35 03 9D 4B 03 E8 C8 5A
CD61:C0 03 D0 F4 18 8A 69 03 48
CD69:8D 34 03 4C 02 CE A9 0D A9
CD71:20 D2 FF A9 01 A2 5A A0 54
CD79:CF 20 BD FF A9 02 A2 08 5F
CD81:A0 00 20 BA FF 20 C0 FF 1F
CD89:A2 02 20 C6 FF A9 9A 20 63
CD91:D2 FF A0 00 20 CF FF 20 0B
CD99:CF FF 20 CF FF 8D B0 02 B7
CDA1:20 CF FF 0D B0 02 F0 49 CA
CDA9:20 CF FF AA 20 CF FF 20 54
```

```
CDB1:CD BD A9 20 20 D2 FF 20 47
CDB9:CF FF F0 26 20 D2 FF 4C 56
CDC1:B8 CD A5 CB C9 3F F0 29 F4
CDC9:C9 40 F0 1E 20 DC CD A5 10
CDD1:CB C9 40 F0 FA 20 DC CD BC
CDD9:4C EB CD A5 CB C9 40 D0 81
CDE1:FA 60 A9 0D 20 D2 FF 4C B1
CDE9:C3 CD A9 00 85 C6 4C 9B 8B
CDF1:CD A5 CB C9 40 F0 FA A9 59
CDF9:00 20 C6 FF A9 02 4C C3 28
CE01:FF A9 0F A2 08 A0 0F 20 16
CE09:BA FF AD 34 03 A2 48 A0 D0
CE11:03 20 BD FF 20 C0 FF A9 9D
CE19:0F 20 C3 FF 4C CC FF A0 F4
CE21:00 B9 2C CF 20 D2 FF C8 C4
CE29:C0 07 D0 F5 60 A0 00 B9 A1
CE31:16 CF 20 D2 FF C8 C0 0B AE
CE39:D0 F5 60 A0 00 B9 21 CF CB
CE41:20 D2 FF C8 C0 0B D0 F5 F9
CE49:60 A0 00 B9 33 CF 20 D2 C6
CE51:FF C8 C0 0C D0 F5 60 A0 B9
CE59:00 B9 3F CF 20 D2 FF C8 5F
CE61:C0 0C D0 F5 60 20 CC FF F8
CE69:A5 BA 20 B4 FF A9 6F 85 E2
CE71:B9 20 96 FF A9 0D 20 D2 5B
CE79:FF A9 20 20 D2 FF 20 D2 31
CE81:FF 20 A5 FF C9 0D D0 F6 F6
CE89:20 D2 FF 4C AB FF 93 0D 42
CE91:20 44 49 53 4B 20 43 4F 5F
CE99:4D 4D 41 4E 44 20 4D 45 C0
CEA1:4E 55 0D 0D 20 31 20 2E 62
CEA9:2E 2E 2E 20 44 49 52 45 E2
CEB1:43 54 4F 52 59 0D 20 32 86
CEB9:20 2E 2E 2E 2E 20 53 43 77
CEC1:52 41 54 43 48 0D 20 33 81
CEC9:20 2E 2E 2E 2E 20 52 45 87
CED1:4E 41 4D 45 0D 20 34 20 56
CED9:2E 2E 2E 2E 20 43 4F 50 BF
CEE1:59 0D 20 35 20 2E 2E 2E 0B
CEE9:2E 20 56 41 4C 49 44 41 D6
CEF1:54 45 0D 20 36 20 2E 2E 6B
CEF9:2E 2E 20 46 4F 52 4D 41 42
CF01:54 0D 20 37 20 2E 2E 2E C9
CF09:2E 20 51 55 49 54 20 44 67
CF11:49 53 4B 0D 00 20 4F 4C CF
CF19:44 20 4E 41 4D 45 20 3E BE
CF21:20 4E 45 57 20 4E 41 4D 8C
CF29:45 20 3E 20 4E 41 4D 45 94
CF31:20 3E 20 44 49 53 4B 20 07
CF39:4E 41 4D 45 20 3E 20 55 DD
CF41:4E 49 51 55 45 20 49 44 5B
CF49:20 3E 4E 30 3A 56 30 3A 1B
CF51:53 30 3A 43 30 3A 52 30 61
CF59:3A 24 0D 54 48 45 20 53 F0
CF61:50 45 45 44 57 41 59 0D E6
CF69:43 4F 50 59 52 49 47 48 AC
CF71:54 20 31 39 39 31 20 43 0F
CF79:4F 4D 50 55 54 45 0D 50 95
CF81:55 42 4C 49 43 41 54 49 8B
CF89:4F 4E 53 20 49 4E 54 4C 49
CF91:20 4C 54 44 0D 41 4C 4C 75
CF99:20 52 49 47 48 54 53 20 D5
CFA1:52 45 53 45 52 56 45 44 35
CFA9:53 50 45 45 44 20 46 49 7C
CFB1:4C 45 20 3F 2C 50 2C 52 0E
```

Daniel Lightner lives in Sidney, Montana. He is the author of *Plotter*, which was published in September. ☐

MOB MOVER

Brian Schkerke and Dave Farquhar

Have you ever tried to position sprites onscreen? At best it is a tedious and frustrating process, and you can waste hours in a futile attempt to use direct POKEs to position them. Even 128 owners with built-in sprite commands at their fingertips face an uphill battle.

To alleviate this problem and reduce the time required for this vital but difficult task from hours to minutes, we give you *MOB Mover*.

MOB Mover allows programmers to position and manipulate up to eight sprites onscreen; then it prints the BASIC code required to duplicate the screen for use in other programs. The program even lets you enter text and position the sprites around the text.

Every sprite register can be manipulated, and the program is packed with features! The coordinates of each sprite are displayed onscreen, and upon quitting the program, you are given all the necessary commands (POKEs in the 64 version and various others in the 128) to achieve the same effects that you had before exiting.

Typing It In

Both *MOB Mover 64* and *MOB Mover 128* are written in BASIC. To avoid typing mistakes, use *The Automatic Proofreader* to type them in. See "Typing Aids" elsewhere in this section. When you've finished, save the program to disk before running.

Note to 128 owners: You can type in either version of the program in 128 mode, but it requires the following direct mode command after running *The Automatic Proofreader*.

```
POKE 828,173
```

This command sets the function keys to return the same values as in 64 mode. To return the keys to their previous definitions, enter POKE 828,183.

Using the Program

Before loading and running *MOB Mover*, you should consider several things. First, if you wish to use your own sprite definitions, you must load them with a binary load (,8,1), define them by using direct POKEs, or use a sprite editor, such as *Sprite Magic*, which resides out of the way of BASIC memory. (Owners of 128s should use the BLOAD command or use the built-in sprite editor.)

If you wish to use a custom character set, load and activate it, also. *MOB Mover* doesn't clear the sprite definition area unless so commanded, so your sprite definitions will remain safe in memory, and unless your character set lies on a page of memory you command *MOB Mover* to fill, it should also be in no danger of being overwritten.

A Few Terms

Some terms used within the program need explaining. The active sprite is the sprite which is currently being moved and whose data line appears in reverse video. The header is made up of the topmost two screen lines and is where all prompts appear. The operating screen is the screen which is normally seen, and the display chart is the table of numbers on the left side of the screen. In the 64 version only, an asterisk that appears before a sprite's data line signifies that the sprite is beyond *x*-coordinate 255 onscreen and must have the MSB X set for it. No need to worry—the POKEs given when you exit the program will tell you how to set that.

After loading and running *MOB Mover*, you'll see the title screen briefly, and then the operating screen will appear. In the 64 version, sprite 0 will be set to the middle of the screen and appear as garbage unless page 192 is the location where you defined your sprites.

In the 128 version, if sprite 1 is activated, it will be black (and thus invisible) and will "hide" all sprites below it. Sprite 0 is the only sprite currently on, so only its data line is displayed. The numbers in the data line represent the sprite number, *x*-coordinate, and *y*-coordinate, respectively.

Help is available at any time by pressing the H key. As a convenience to 128 owners, help screens are also printed to the 80-column screen. This screen is otherwise unused by the program and can be activated by simply switching your display. For those of you who don't have an 80-column display, the H command is still available.

Commands

The first command to learn is how to move a sprite. This is done by using either the cursor keys or a joystick in port 2. In the 128 version, the keypad may also be used. This moves the sprite by one pixel at a time. Because this could become tedious, the step value may be increased. Press S and enter the new value you wish to have sprites move by. You can also press I and directly enter *x*- and *y*-coordinates for the sprite. However, using this method, you cannot move the sprite beyond the first 255 positions onscreen; you must do this manually. (The 128 version, due to its sprite commands, doesn't have this limitation.)

To change the active sprite, press A. You'll be prompted to enter a number from 0 to 7 (1 to 8 in the 128 version), and that sprite will then be switched on. Due to its coordinates, definition, and/or color, this sprite may not be visible onscreen. Any sprite whose data line appears onscreen is activated, however.

If you wish to center all sprites, press the Up Arrow key. This will position all sprites onscreen at the original location of sprite 0.

Turn On, Fill, and Cycle

To turn on all sprites, press the Asterisk key. This will instantly turn on all eight sprites, which again may not be visible due to no definition, screen coordinates, or color.

If you want to fill a sprite, press F. This will turn the active sprite into a solid single-color box, making it visible.

Hit B to cycle through the available background colors. To cycle through the foreground colors, press C. *MOB Mover* will not allow these two colors to be the same. To change sprite color, press the space bar. This, too, will cycle through the available colors. To cycle through multicolors one and two, press < and > respectively. Sprite colors are not limited in any way by this program's parameters.

Chart, Poke, and Multicolor

To toggle the display chart on and off (and have full use of typing on the screen), press D. If the display chart is off, OFF will appear in the header. Otherwise, the position is empty.

If for some reason you need to poke to a location in direct mode, you can use the Back Arrow key. This will allow you to poke any number from 0–255 into any location from 1–65535. While values outside these boundaries are ignored, no other error checking is done, so use this command with caution.

Multicolor mode can be toggled by using the f1 key. Nothing noticeable will happen if you have filled the sprites in; however, it may have a very noticeable effect if you have your own sprite definitions in memory.

Use f3 and f5 to toggle *x*- and *y*-expansion, respectively. These affect only the active sprite, as does f1.

If your sprite definition lies at a page other than 192, you can use the P command to set the pointer to the location of your own definitions. To reset all sprite pointers to their default values, press Clr/Home.

Enter Text

To type onscreen, you can use the T command. This will allow you to type on the screen as necessary. If, however, you type over the display chart without first turning it off, your text will be damaged when the chart is updated. To exit this mode, press Shift–Return.

Turning sprites on and off is done by using the Plus and Minus keys. Note that when you switch to a sprite, it's automatically turned on.

Toggling sprite priority is achieved by pressing the Equal Sign. This allows you to determine whether the foreground or sprite has display priority. Thus, you can decide whether a sprite will appear on the plane in front of (default) or behind the text screen. Due to the limitations of the VIC-II, lower-numbered sprites always appear in front of higher-numbered sprites, regardless of priority.

When you want to exit the program, press E. You'll be asked whether you want the necessary commands to duplicate the screen you have just created to be sent to the screen or printer. Press P for a hardcopy or any other key for screen output. Remember to first turn on your printer before selecting this option. After the program finishes, it will exit to BASIC with your sprite definitions unaffected.

Hints and Tips

When all eight sprites are onscreen at once, chart updates can slow down the program's responsiveness. To avoid this, turn the display chart off except when needed. *MOB Mover* is relatively unaffected by fast loaders, RAM disks, ML monitors, extensions, and other similar memory-resident programs. However, to be safe, test *MOB Mover* with your favorite set of utilities before attempting anything important.

MOB MOVER 64

```
AS 0 CLR
KP 5 REM COPYRIGHT 1991 - COMP
     UTE PUBLICATIONS INTL LTD
      - ALL RIGHTS RESERVED
PJ 10 POKE53280,.:POKE53281,.:
      PRINT"{N}{WHT}{CLR}
      {10 DOWN}";:PRINTTAB(13)
      "{M}{RVS} MOB MOVER!
      {OFF}{G}
AE 20 FORX=1TO1000:NEXT:V=5324
      8:B1=2040:B2=192:PRINT"
      {CLR}{N}";:GOSUB40
KA 30 GOSUB850:GOSUB90:GOSUB13
      30:GOTO30
CQ 40 C(1)=.:C(2)=1:FORX=.TO7:
      S(X)=.:FORY=1TO2:CO(X,Y)
      =V+(X*2+C(Y)):NEXTY,X
XH 50 SV=1:BC=.:CC=1:S(.)=1:AS
      =.:FORX=.TO7:POKE(B1+X),
      (B2+X):NEXT
MM 60 SP$="{40 SPACES}":POKEV+
      21,1:POKEV+16,.
HA 70 FORX=.TO7:ID$(X)=" ":NEX
      T
SQ 80 POKEV+21,1:POKEV+28,.:PO
      KEV+23,.:POKEV+29,.:RETU
      RN
SM 90 PRINT"{HOME}{RVS}MOB
      {SHIFT-SPACE}MOVER!{OFF}
      {2 DOWN}";:IFCO=1THENPRI
      NT"{2 UP}{10 SPACES}OFF"
      :RETURN
XB 110 PRINT:FORX=.TO7:IFAS=XT
       HENPRINT"{RVS}";
DF 120 IFS(X)=1THENPRINTID$(X)
       ;X;":";STR$(PEEK(CO(X,1
       )))" /";STR$(PEEK(CO(X,
       2)));
BD 130 IFS(X)=1THENPRINT"{OFF}
       {5 SPACES}"
MM 135 PRINT"{OFF}";:NEXT:RETU
       RN
QS 140 BC=BC+1:IFBC=16THENBC=.
FG 150 IFBC=CCTHENBC=BC+1
HP 160 POKE53280,BC:POKE53281,
       BC:RETURN
HF 170 CC=CC+1:IFCC=16THENCC=.
PK 180 IFCC=BCTHENCC=CC+1
QE 190 POKE646,CC:RETURN
RE 200 MSG$="NEW STEP VALUE":G
       OSUB820:INPUTA$:SV=VAL(
        A$):IFSV<=.THENSV=1
SD 210  RETURN
EJ 220  MSG$="FILL SPRITE #"+ST
        R$(AS)+": [Y/N]":GOSUB8
        20:GOSUB870
JD 230  IFA$="Y"THEN250
MF 240  RETURN
BF 250  SP=(PEEK(B1+AS))*64:FOR
        X=.TO63:POKESP+X,255:NE
        XT:RETURN
KD 260  PRINT"{RVS} {OFF}{LEFT}
        ";:GETA$:IFA$="{DOWN}"O
        RA$="{UP}"ORA$="{RIGHT}
        "ORA$="{LEFT}"THEN320
EB 270  IFA$="{HOME}"THENPRINT"
         ";:PRINTA$;:GOTO260
MC 280  IFA$=CHR$(13)THEN310
KP 290  IFA$=CHR$(141)THENPRINT
        " ";:RETURN
PD 300  PRINTA$;:GOTO260
JF 310  PRINT" ";:PRINTA$;:GOTO
        260
KM 320  PRINT" {LEFT}";:PRINTA$
        ;:GOTO260
JE 330  MSG$="CHANGE ACTIVE SPR
        ITE'S POINTER TO":GOSUB
        820:INPUTA$
RE 340  A=VAL(A$):IFA<=.THENRET
        URN
ME 350  POKEB1+AS,A:RETURN
BP 360  MSG$="CHANGE TO SPRITE
        {SPACE}# [0-7]":GOSUB82
        0:GOSUB870:A=VAL(A$)
QD 370  IFA>7THENA=AS
AE 380  AS=A:S(AS)=1:POKEV+21,P
        EEK(V+21)OR(2↑AS):RETUR
        N
DG 390  MSG$="INPUT X COORDINA
        TE":GOSUB820:INPUTI$:C1
        =VAL(I$)
JE 391  IFC1<0ORC1>255THENRETUR
        N
BJ 400  GOSUB850:MSG$="INPUT Y
        {SPACE}COORDINATE":GOS
        UB820:INPUTI$:C2=VAL(I$
        )
RF 410  IFC2<0ORC2>255THENRETUR
        N
GG 420  POKECO(AS,1),C1:POKECO(
        AS,2),C2:RETURN
SK 650  POKEV+21,PEEK(V+21)OR(2
        ↑AS):RETURN
AF 660  POKEV+21,PEEK(V+21)AND(
        255-2↑AS):RETURN
SB 670  FORX=.TO7:POKEB1+X,B2+X
        :RETURN
KR 680  MV=PEEK(CO(AS,1)):IFMV-
        SV<0ANDXP(AS)=1THEN710
QK 690  IFMV-SV<0THENRETURN
QX 700  MV=MV-SV:POKE(CO(AS,1))
        ,MV:RETURN
FH 710  POKE(V+16),PEEK(V+16)AN
        D(255-(2↑AS)):ID$(AS)="
         ":MV=(MV-SV)+255:XP(S)
        =.
QJ 720  POKE(CO(AS,1)),MV:RETUR
        N
FE 730  MV=PEEK(CO(AS,1)):IFMV+
        SV>255ANDXP(AS)=.THEN76
        0
EK 740  IFMV+SV>255THENRETURN
MQ 750  MV=MV+SV:POKE(CO(AS,1))
        ,MV:RETURN
ME 760  POKE(V+16),PEEK(V+16)OR
        (2↑AS):MV=MV+SV:MV=MV-2
        55:POKECO((AS,1)),MV:XP
        (AS)=1
QP 770  ID$(AS)="*":RETURN
GE 780  MV=PEEK(CO(AS,2)):IFMV-
        SV<.THENRETURN
AG 790  MV=MV-SV:POKE(CO(AS,2))
        ,MV:RETURN
GM 800  MV=PEEK(CO(AS,2)):IFMV+
        SV>255THENRETURN
FH 810  MV=MV+SV:POKE(CO(AS,2))
        ,MV:RETURN
SK 820  PRINT"{HOME}";SP$;SP$;
SD 830  FORX=1TO40:PRINT"*";:NE
        XT
MH 840  PRINT"{HOME}";MSG$;:RET
        URN
HB 850  PRINT"{HOME}";SP$;SP$;S
        P$;SP$
RQ 860  PRINT"{HOME}";:RETURN
GH 870  POKE198,.:WAIT198,1:GET
        A$:RETURN
PM 880  SC=(PEEK(V+39+AS)):SC=S
        C+1:IFSC=256THENSC=.
MX 890  POKE((V+39)+AS),SC:RETU
        RN
MF 900  IFMC(AS)=.THENMC(AS)=1:
        POKEV+28,PEEK(V+28)OR(2
        ↑AS):RETURN
SK 910  IFMC(AS)=1THENMC(AS)=.:
        POKEV+28,PEEK(V+28)AND(
        255-2↑AS):RETURN
GX 920  IFXE(AS)=.THENXE(AS)=1:
        POKEV+29,PEEK(V+29)OR(2
        ↑AS):RETURN
CA 930  IFXE(AS)=1THENXE(AS)=.:
        POKEV+29,PEEK(V+29)AND(
        255-2↑AS):RETURN
JF 940  IFYE(AS)=.THENYE(AS)=1:
        POKEV+23,PEEK(V+23)OR(2
        ↑AS):RETURN
AG 950  IFYE(AS)=1THENYE(AS)=.:
        POKEV+23,PEEK(V+23)AND(
        255-2↑AS):RETURN
AK 960  IFPR(AS)=.THENPR(AS)=1:
        POKEV+27,PEEK(V+27)OR(2
        ↑AS):RETURN
AH 965  IFPR(AS)=1THENPR(AS)=.:
        POKEV+27,PEEK(V+27)AND(
        255-2↑AS):RETURN
JH 970  IFCO=.THENCO=1:RETURN
QE 980  IFCO=1THENCO=.:RETURN
JC 990  FORX=.TO7:FORY=1TO2:POK
        ECO(X,Y),.:NEXTY,X:RETU
        RN
XD 1000 MC=PEEK(V+37):MC=MC+1:
         IFMC>256THENMC=.
SQ 1010 POKEV+37,MC:RETURN
AS 1020 MC=PEEK(V+38):MC=MC+1:
         IFMC>256THENMC=.
ES 1030 POKEV+38,MC:RETURN
DQ 1040 MSG$="LOCATION TO POKE
        ":GOSUB820:INPUTA$:LO=
        VAL(A$)
HX 1050 IFLO<=.ORLO>65535THENR
        ETURN
ES 1060 GOSUB850:MSG$="NUMBER
        {SPACE}TO POKE":GOSUB8
        20:INPUTA$:NU=VAL(A$)
XK 1070 IFNU<0ORNU>255THENRETU
        RN
ED 1080 POKELO,NU:RETURN
EF 1090 IFAO=.THENAO=1:POKEV+2
        1,255:FORX=.TO7:S(X)=1
        :NEXT:RETURN
GJ 1100 IFAO=1THENAO=.:POKEV+2
        1,.:FORX=.TO7:S(X)=0:N
        EXT:PRINT"{CLR}":RETUR
        N
EH 1110 FORX=.TO7:POKECO(X,1),
        155:POKECO(X,2),130:NE
        XT:RETURN
RP 1120 MSG$="SCREEN OR PRINTE
        R?":GOSUB820:WAIT198,1
        :GETA$
FA 1121 IFA$<>"P"THENS=1
DE 1122 OPEN4,(4-S),7
EC 1123 PV=PEEK(V+21):POKEV+21
        ,.:PRINT#4,"{CLR}LOCAT
        ION","POKE","OBJECTIVE
        "
CM 1130 PRINT#4,V+21,PV,"TURNS
         ON SPRITES
XJ 1140 FORX=.TO7:IFS(X)=.THEN
        NEXT:GOTO1160
AH 1150 PRINT#4,B1+X,PEEK(B1+X
        ),"SPRITE"X"POINTER":N
        EXT
FB 1160 FORX=.TO7:IFS(X)=.THEN
        NEXT:GOTO1180
SE 1170 PRINT#4,(PEEK(B1+X))*6
        4,"DATA","SPRITE"X"DAT
        A":NEXT
RG 1180 IFSTHENPK$="{2 DOWN}PR
        ESS ANY KEY TO CONTINU
        E":PRINTPK$:GOSUB870
DG 1190 IFSTHENPRINT"{CLR}LOCA
        TION","POKE","OBJECTIV
        E
QQ 1200 FORX=.TO7:IFS(X)=.THEN
        NEXT:GOTO1220
PB 1210 PRINT#4,(V+39+X),PEEK(
        V+39+X),"SPRITE"X"COLO
        R":NEXT
SC 1220 IFPEEK(V+28)THEN1250
DX 1230 PRINT#4,(V+28),PEEK(V+
        28),"SET MULTICOLOR MO
        DE
RC 1240 PRINT#4,(V+37),PEEK(V+
        37),"MULTICOLOR 1"
PG 1245 PRINT#4,V+38,PEEK(V+38
        ),"MULTICOLOR 2
RX 1250 PRINT#4,V+29,PEEK(V+29
        ),"SPRITES X EXPAND
EC 1260 PRINT#4,V+23,PEEK(V+23
        ),"SPRITES Y EXPAND
FE 1270 IFSTHENPRINTPK$:GOSUB8
        70
MD 1280 IFSTHENPRINT"{CLR}LOCA
        TION","POKE","OBJECTIV
```

```
          E
AE 1290 FORX=.TO7:IFS(X)=.THEN
          NEXT:GOTO1310
QA 1300 FORY=1TO2:PRINT#4,CO(X
          ,Y),PEEK(CO(X,Y)),"SPR
          ITE"X"POSITION":NEXTY,
          X
HH 1310 IFPEEK(V+16)THENPRINT#
          4,V+16,PEEK(V+16),"MSB
          {SHIFT-SPACE}X
          {SHIFT-SPACE}POSITION
BH 1320 PRINTPK$;:WAIT198,1:PO
          KE198,0:PRINT"{CLR}":E
          ND
BP 1330 C$="ABCEFHPST+-*↑←
          {LEFT}{RIGHT}{UP}
          {DOWN}{F1}{F3}{F5}{F7}
          {CLR} <>=DI"
AJ 1339 CN=.
GR 1340 GETA$:JOY=NOTPEEK(5632
          0)AND15:IFJOYTHENGOSUB
          3000
CA 1345 IFA$<>""THENGOTO1350
BK 1347 GOTO1340
BD 1350 FORX=1TO30:IFCNTHENX=3
          0:NEXT:GOTO1380
SK 1360 IFA$=MID$(C$,X,1)THENC
          N=X
SS 1370 NEXT:GOTO1340
HF 1380 ONCNGOTO360,140,170,11
          20,220,2000,330,200,26
          0,650,660,1090,1110,10
          40
MK 1390 ONCN-14GOTO680,730,780
          ,800,900,920,940,990,6
          70,880,1020,1000,960,9
          70,390
CJ 1400 GOTO1340
CM 2000 SO=PEEK(V+21):POKEV+21
          ,0
CF 2005 PRINT"{CLR}{RVS}MOB
          {SHIFT-SPACE}MOVER!
          {OFF} HELP SCREEN
          {9 SPACES}1 OF 2
          {3 SPACES}"
AF 2010 PRINT"A","CHANGE ACTIV
          E SPRITE
CX 2020 PRINT"B","CHANGE BACKG
          ROUND COLOR
QF 2030 PRINT"C","CHANGE CHARA
          CTER COLOR
FB 2040 PRINT"D","CHART DISPLA
          Y ON/OFF
JM 2050 PRINT"E","EXIT PROGRAM
          /VIEW POKES
SH 2060 PRINT"F","FILL ACTIVE
          {SPACE}SPRITE
PC 2070 PRINT"H","HELP SCREENS
SJ 2075 PRINT"I","INPUT COORD
          INATES
AR 2080 PRINT"P","SPRITE POINT
          ER
CS 2090 PRINT"S","SET STEP VAL
          UE
AA 2100 PRINT"T","TYPE ON SCRE
          EN
PF 2110 PRINTSP$;SP$;SP$;"PRES
          S ANY KEY":POKE198,0:W
          AIT198,1
BH 2200 PRINT"{CLR}{RVS}MOB
          {SHIFT-SPACE}MOVER!
          {OFF} HELP SCREEN
          {9 SPACES}2 OF 2
          {3 SPACES}"
HB 2210 PRINT"=","SPRITE PRIOR
          ITY TOGGLE
BX 2220 PRINT"+","ACTIVE SPRIT
          E ON
EP 2230 PRINT"-","ACTIVE SPRIT
          E OFF
PM 2240 PRINT"*","ALL SPRITES
          {SPACE}ON/OFF
CJ 2250 PRINT"↑","CENTER SPRIT
          ES ONSCREEN
QA 2260 PRINT"<","SET MULTICOL
          OR 1
RE 2270 PRINT">","SET MULTICOL
          OR 2
GS 2280 PRINT"←","DIRECT POKES
QS 2290 PRINT"F1","MULTICOLOR
          {SPACE}TOGGLE
HJ 2300 PRINT"F3","X EXPANSION
           TOGGLE
QQ 2310 PRINT"F5","Y EXPANSION
           TOGGLE
GM 2320 PRINT"F7","RESET SPRIT
          E POSITIONS
PS 2330 PRINT"CLR","RESET SPRI
          TE POINTERS
PQ 2340 PRINT"CRSR KEYS","MOVE
           SPRITE
FH 2350 PRINT"SPACEBAR","SPRIT
          E COLOR
SB 2360 PRINTSP$;SP$;SP$;"PRES
          S ANY KEY":POKE198,0:W
          AIT198,1:POKEV+21,SO
GC 2370 PRINT"{CLR}";:RETURN
QJ 3000 IFJOY=1THENA$="{UP}":R
          ETURN
PH 3010 IFJOY=2THENA$="{DOWN}"
          :RETURN
FG 3020 IFJOY=4THENA$="{LEFT}"
          :RETURN
AC 3030 IFJOY=8THENA$="{RIGHT}
          ":RETURN
CX 3040 RETURN
```

MOB MOVER 128

```
EB 10 REM COPYRIGHT 1991 - COM
        PUTE PUBLICATIONS INTERN
        ATIONAL LIMITED - ALL RI
        GHTS RESERVED
EQ 20 FAST:GRAPHIC5:GOSUB450:P
        RINT"{CLR}{N}"
XH 30 FORI=.TO62:F$="↑"+F$:NEX
        T:T=1:AS=1:M1=RSPCOLOR(1
        ):M2=RSPCOLOR(2)
PJ 40 POKE828,183:COLOR0,1:COL
        OR4,1:COLOR5,2:CHAR1,13,
        11,"MOB MOVER!",1
XF 50 SV=1:BC=1:CC=2:AS=1:OX=R
        SPPOS(1,0):OY=RSPPOS(1,1
        ):SLEEP2:SCNCLR
BQ 60 GOSUB890:CHAR1,0,0,"MOB
        {SPACE}MOVER!",1:IFTTHEN
        GOSUB210:ELSECHAR1,24,0,
        "OFF"
EC 70 J=JOY(2):IF(JAND1)THEN13
        0
BX 80 GETA$
PG 90 CN=INSTR("ABCDEFHIPST+-*
        ↑←{LEFT}4{RIGHT}6{UP}8
        {DOWN}2{F1}{F3}{F5}{F7}
        {CLR} <>=",A$)
PP 100 IFCN=.THEN70
EP 110 ONCNGOSUB420,250,270,99
         0,1090,190,450,1020,390
         ,300,320,800,810,1070,1
         080,1030,840,840,850,85
         0,860,860,870,870,930,9
         40,950,960,820,910,1000
         ,970,180
SQ 120 GOTO60
GF 130 IFJ=1THENA$="{UP}"
GQ 140 IFJ=3THENA$="{RIGHT}"
GB 150 IFJ=5THENA$="{DOWN}"
HP 160 IFJ=7THENA$="{LEFT}"
FB 170 GOTO90
FS 180 I=ABS(RSPRITE(AS,2)-1):
         SPRITEAS,,,I:RETURN
PP 190 MSG$="FILL SPRITE #"+ST
         R$(AS)+"?":GOSUB880:GET
         KEYA$:IFA$<>"Y"THENRETU
         RN
GB 200 SPRSAVF$,AS:RETURN
AE 210 WINDOW0,4,15,19,1:FORX=
         1TO8:IFX=ASTHEN240
EK 220 IFRSPRITE(X,.)=1THENPRI
         NTX;":";RSPPOS(X,.);"/"
         ;RSPPOS(X,1)
GA 230 NEXT:PRINTCHR$(27)"@
         {2 HOME}":RETURN
BJ 240 PRINTX"{RVS}:"RSPPOS(X,
         .)"{LEFT} /"RSPPOS(X,1)
         "{OFF}":GOTO230
ER 250 BC=BC+1:IFBC=17THENBC=1
RG 260 COLOR0,BC:COLOR4,BC:RET
         URN
QJ 270 CC=CC+1:IFCC=17THENCC=1
BR 280 IFCC=BCTHENCC=CC+1:GOTO
         270
CQ 290 COLOR5,CC:RETURN
JC 300 MSG$="NEW STEP VALUE":G
         OSUB880:INPUTA$:SV=VAL(
         A$):IFSV=<.THENSV=1
PK 310 RETURN
EE 320 PRINT"{RVS} {OFF}{LEFT}
         ";:GETA$:IFA$="{DOWN}"O
         RA$="{UP}"ORA$="{RIGHT}
         "ORA$="{LEFT}"THEN380
BB 330 IFA$="{HOME}"THENPRINT"
          ";:PRINTA$:GOTO320
CG 340 IFA$=CHR$(13)THEN370
EX 350 IFA$=CHR$(141)THENPRINT
         " ";:RETURN
MC 360 PRINTA$;:GOTO320
HE 370 PRINT" ";:PRINTA$;:GOTO
         320
KP 380 PRINT" {LEFT}";:PRINTA$
         ;:GOTO320
AX 390 MSG$="CHANGE ACTIVE SPR
         ITE'S POINTER TO":GOSUB
         880:INPUTA$
CB 400 A=VAL(A$):IFA<=.THENRET
```

```
        URN
ME 410  POKE2040+AS-1,A:RETURN
BG 420  MSG$="CHANGE TO SPRITE
        {SPACE}# [1-8]":GOSUB88
        0:GETKEYA
PA 430  IFA<1ORA>8THENRETURN
PA 440  SPRITEA,1:AS=A:RETURN
HH 450  IFRGR(.)THENPRINT"
        {2 HOME}{N}{8}"CHR$(27)
        "R"
JC 460  PRINT"{CLR}{RVS}MOB
        {SHIFT-SPACE}MOVER!
        {OFF} HELP SCREEN
        {9 SPACES}1 OF 2
        {3 SPACES}"
BX 470  PRINT"A","CHANGE ACTIVE
         SPRITE
PH 480  PRINT"B","CHANGE BACKGR
        OUND COLOR
XD 490  PRINT"C","CHANGE CHARAC
        TER COLOR
HM 500  PRINT"D","CHART DISPLAY
         ON/OFF
AS 510  PRINT"E","EXIT PROGRAM/
        VIEW COMMANDS
DC 520  PRINT"F","FILL ACTIVE S
        PRITE
EM 530  PRINT"H","HELP SCREENS
KF 540  PRINT"I","INPUT COORDI
        NATES
SH 550  PRINT"P","SPRITE POINTE
        R
HD 560  PRINT"S","SET STEP VALU
        E
DX 570  PRINT"T","TYPE ON SCREE
        N
JS 580  IFRGR(.)THENWINDOW40,0,
        79,24:PRINT"{5}":GOTO60
        0
FH 590  PRINT"{3 DOWN}PRESS ANY
         KEY":GETKEYA$
MK 600  PRINT"{CLR}{RVS}MOB
        {SHIFT-SPACE}MOVER!
        {OFF} HELP SCREEN
        {9 SPACES}2 OF 2
        {3 SPACES}"
XC 610  PRINT"=","SPRITE PRIORI
        TY TOGGLE
HE 620  PRINT"+","ACTIVE SPRITE
         ON
MC 630  PRINT"-","ACTIVE SPRITE
         OFF
BX 640  PRINT"*","ALL SPRITES O
        N/OFF
HA 650  PRINT"↑","CENTER SPRITE
        S ONSCREEN
GE 660  PRINT"<","SET MULTICOLO
        R 1
DA 670  PRINT">","SET MULTICOLO
        R 2
JE 680  PRINT"←","DIRECT POKES
PC 690  PRINT"F1","MULTICOLOR T
        OGGLE
XB 700  PRINT"F3","X EXPANSION
        {SPACE}TOGGLE
JC 710  PRINT"F5","Y EXPANSION
        {SPACE}TOGGLE
CP 720  PRINT"F7","RESET SPRITE
        POSITIONS
SC 730  PRINT"CLR","RESET SPRIT
        E POINTERS
FB 740  PRINT"CRSR KEYS","MOVE
        {SPACE}SPRITE
PB 750  PRINT"KEYPAD","MOVE SPR
        ITE
AK 760  PRINT"SPACEBAR","SPRITE
        COLOR
SH 770  IFRGR(.)THENGRAPHIC0:SL
        OW:RETURN
CD 780  PRINT"{3 DOWN}PRESS ANY
        KEY":GETKEYA$
RJ 790  PRINT"{CLR}";:RETURN
EX 800  SPRITEAS,1:RETURN
HX 810  SPRITEAS,0:RETURN
JX 820  MSG$="RESET SPRITE POIN
        TERS?":GOSUB880:GETKEYA
        $:IFA$<>"Y"THENRETURN
EM 830  FORI=.TO7:POKE2040+I,(5
        6+I):NEXT:RETURN
BD 840  MOVSPRAS,-SV,+0:RETURN
DA 850  MOVSPRAS,+SV,+0:RETURN
CD 860  MOVSPRAS,+0,-SV:RETURN
GA 870  MOVSPRAS,+0,+SV:RETURN
HH 880  GOSUB890:CHAR1,0,2,"***
        ***************************
        **************":CHAR1,0,
        0,MSG$:RETURN
BS 890  WINDOW0,0,39,4,1:PRINT"
        {2 HOME}":RETURN
DC 900  PRINT"{HOME}";:RETURN
GF 910  SC=RSPRITE(AS,1):SC=SC+
        1:IFSC>16THENSC=1
MX 920  SPRITEAS,,SC:RETURN
CD 930  I=RSPRITE(AS,5):I=ABS(I
        -1):SPRITEAS,,,,,I:RET
        URN
SQ 940  I=RSPRITE(AS,3):I=ABS(I
        -1):SPRITEAS,,,I:RETUR
        N
QD 950  I=RSPRITE(AS,4):I=ABS(I
        -1):SPRITEAS,,,,I:RETU
        RN
GQ 960  FORX=1TO8:MOVSPRX,OX,OY
        :NEXT:RETURN
PF 970  M2=M2+1:IFM2>16THENM2=1
DP 980  SPRCOLORM1,M2:RETURN
DP 990  T=ABS(T-1):WINDOW0,4,15
        ,19,1:RETURN
BF 1000 M1=M1+1:IFM1>16THENM1=
        1
QA 1010 GOTO980
PG 1020 MSG$="NEW X-COORDINATE
        ":GOSUB880:INPUTA$:X=V
        AL(A$):MID$(MSG$,5,1)=
        "Y":GOSUB880:INPUTA$:I
        =VAL(A$):MOVSPRAS,X,I:
        RETURN
GX 1030 MSG$="LOCATION TO POKE
        ":GOSUB880:INPUTA$:LO=
        VAL(A$):IFLO<=.ORLO>65
        535THENRETURN
KC 1040 GOSUB890:MSG$="NUMBER
        {SPACE}TO POKE":GOSUB8
        80:INPUTA$:NU=VAL(A$)
KP 1050 IFNU<0ORNU>255THENRETU
        RN
MB 1060 POKELO,NU:RETURN
CJ 1070 AO=ABS(AO-1):FORX=1TO8
        :SPRITEX,AO:NEXT:RETUR
        N
BQ 1080 FORX=1TO8:SPRITEX,1:MO
        VSPRX,264,84:NEXT:RETU
        RN
FD 1090 MSG$="SCREEN OR PRINTE
        R?":GOSUB880:GETKEYA$:
        IFA$<>"P"THENS=1
HG 1100 OPEN4,(4-S),7
QK 1110 PRINT#4,"{CLR}TURN ON
        {SPACE}SPRITES"CHR$(13
        )
CC 1120 FORI=1TO8
RG 1130 IFRSPRITE(I,.)THENPRIN
        T#4,"SPRITE"I","RSPRIT
        E(I,.)","RSPRITE(I,1)"
        ,"RSPRITE(I,2)","RSPRI
        TE(I,3)","RSPRITE(I,4)
        ","RPSRITE(I,5):NEXT
EB 1140 PRINT#4,CHR$(13)"POSIT
        ION SPRITES"CHR$(13)
KH 1150 FORI=1TO8
GP 1160 IFRSPRITE(I,.)THENPRIN
        T#4,"MOVSPR"I","RSPPOS
        (I,.)","RSPPOS(I,1):NE
        XT
RK 1170 IFSTHENPRINT"{2 DOWN}P
        RESS ANY KEY TO CONTIN
        UE":GETKEYA$
BX 1180 PRINT#4,"{CLR}SET SPRI
        TE POINTERS"CHR$(13)
EQ 1190 FORI=.TO7:IFPEEK(2040+
        I)<>56+ITHENPRINT#4,"P
        OKE"2040+I","PEEK(2040
        +I):NEXT
CH 1200 PRINT#4,CHR$(13)"SET C
        OLORS"CHR$(13)
JD 1210 PRINT#4,"SPRCOLOR"RSPC
        OLOR(1)","RSPCOLOR(2)
HQ 1220 FORI=.TO5:PRINT#4,"COL
        OR"I","RCLR(I):NEXT
```

Brian Schkerke wrote the 64 version, and Dave Farquhar wrote the 128 version. They live in Fenton, Missouri. ❐

HOVERJET

Mike Sedlezsky

The time is the future. Your nation is at war, and you've been assigned to destroy an enemy supply depot. Your weapon is a state-of-the-art aircraft called HoverJet. The assignment would be a snap if it weren't for the enemy forces in similarly equipped jets who stand in your way.

HoverJet is a machine language game program for one or two players. Use *MLX*, our machine language entry program, to enter the program. See "Typing Aids" elsewhere in this section. When *MLX* prompts you, respond with the values given below.

Starting address: 0801
Ending address: 16F6

When you've finished typing *HoverJet*, be sure to save a copy before exiting *MLX*.

Although *HoverJet* is a machine language program, it loads and runs like a BASIC program.

Armament

A joystick in port 2 controls your craft. This jet has the ability to hover and move up and down like a helicopter. It's equipped with deadly laser pulse missiles, but there is a rumor that the enemy has a guided version of this weapon.

The default is for a single-player game, but a second player can join in at any time by pressing the fire button on a joystick plugged into port 1. A demonstration is activated if a joystick button is not pressed within ten seconds after the title screen appears.

The Mission

The *HoverJet* game screen is a 3-D layout of the supply depot, with you at the bottom of the screen and the enemy at the top. Across the very top is a row of supply crates that you must destroy. Your jet is sitting behind a warehouse, which you use as a shield. The enemy is behind another row. You must fly above the warehouse, sight on an enemy crate, and fire before the enemy fires on you.

Indicators

To the right of the screen are your readouts. Starting at the top is your score record. You receive points for hitting targets and bonuses for surviving. Next is your fuel gauge. The game ends abruptly if this gauge reads empty. It turns red when your fuel is low.

Next is a warning indicator. Because the HoverJet is so new, it still has some bugs that have to be worked out. One problem is that the engines overheat if you hold the throttle on too long or if you remain idling on the ground for too long a period. This indicator progresses from green to yellow to red as heat builds. Should it reach the critical red level, the screen will flash red. At this point you are damaging your engines and risking an explosion if you don't back off for a few seconds. Fuel is also consumed faster when hot.

Next is the damage level indicator that will progress from green to yellow to red as damage to your craft increases. The end is near if damage reaches the critical red level. You receive varying amounts of damage from enemy missiles. For example, a single shot taken straight on may finish you, but you can withstand several wing shots. The screen flashes when you receive a hit. The next indicator is used for sighting on the crates that are your targets. If you rise too high, the indicator turns blue, and your missile will pass over the target. Fire when the indicator is green. Use the fighter indicator to match your height to that of an enemy jet. Blue means you're too high, and red means you're too low. You are matched when the light is green.

Next is the missile indicator. Use it to avoid incoming missiles. Stay out of the green range, or you risk getting hit.

Randomly selected light blue and dark blue crates are bonus targets. Hit a light blue crate to increase your laser missile speed and gain an extra 1,000 points. This feature will stay in effect until the current game ends. Hit a dark blue crate, and your damage is repaired, your jet moves faster, and you receive an extra 10,000 points. These crates rarely appear, though. After you load the program but before you run it, you can change the color of your jet by entering POKE 3536, *color* in immediate mode. *Color* is any Commodore color from 0–15.

HOVERJET

```
0801:0C 08 01 00 9E 20 32 35 48
0809:36 31 00 00 00 25 24 26 83
0811:20 20 25 24 24 26 20 20 3A
0819:25 24 26 21 22 23 20 20 99
0821:21 22 22 23 20 20 21 22 A6
0829:23 02 19 20 0D 09 0B 05 18
0831:20 13 05 04 0C 05 1A 0B AA
0839:19 FE FF 1C FE 2D 7F 00 03
0841:00 00 00 00 00 00 00 00 51
0849:00 08 00 00 08 00 00 3A D5
0851:00 00 3B 00 00 BB 00 00 B7
0859:AB C0 02 AB C0 0A AB 80 70
0861:0A AA A0 0A AA A0 0D AB 73
0869:A8 00 2B 98 00 07 1C 00 11
0871:00 00 00 00 00 00 00 00 81
0879:00 00 00 00 00 00 41 00 0C
0881:00 00 00 00 00 00 08 00 A1
0889:00 08 00 00 08 00 00 2E 0A
0891:00 00 2E 00 00 EE C0 00 A4
0899:EE C0 02 EE E0 02 AA A0 85
08A1:02 AA A0 0A AA A8 0A AE CC
08A9:A8 0D AE 9C 00 2E 00 00 A9
08B1:00 00 00 00 00 00 00 00 C1
08B9:00 00 00 00 00 00 41 00 4C
08C1:00 00 00 00 00 00 00 00 D1
08C9:00 08 00 00 08 00 00 2B 47
08D1:00 00 3B 00 00 3B 80 00 37
08D9:FA 80 00 FA A0 00 BA A8 5A
08E1:02 AA A8 02 AA A8 0A BA 99
08E9:9C 09 BA 00 0D 34 00 00 1B
08F1:00 00 00 00 00 00 00 00 02
08F9:00 00 00 00 00 00 41 00 8C
0901:00 00 00 00 00 01 43 00 9D
0909:02 A3 00 00 AF 90 00 A9 6E
0911:A0 00 29 80 00 2B 80 00 4E
0919:3B C0 00 0F 00 00 0F 00 08
0921:00 03 00 00 01 00 00 00 FB
0929:00 00 00 00 00 00 00 00 3B
0931:00 00 00 00 00 00 00 00 43
0939:00 00 00 00 00 00 41 00 CD
0941:00 00 00 00 00 00 0C 00 6B
0949:01 4C 50 02 AE A0 00 A6 B7
0951:80 00 A6 80 00 EE C0 00 BD
0959:EE C0 00 2E 00 00 0C 00 0E
0961:00 0C 00 00 04 00 00 00 96
0969:00 00 00 00 00 00 00 00 7B
0971:00 00 00 00 00 00 00 00 83
0979:00 00 00 00 00 00 41 00 0E
0981:00 00 00 00 00 00 30 50 44
0989:00 3E A0 01 3E 80 02 9A E1
0991:80 00 9A C0 00 BA 00 00 2E
0999:FB 00 00 3C 00 00 3C 00 E5
09A1:00 30 00 00 10 00 00 00 40
09A9:00 00 00 00 00 00 00 00 BB
09B1:00 00 00 00 00 00 00 00 C3
09B9:00 00 00 00 00 00 41 00 4E
09C1:08 00 00 08 00 00 00 00 58
09C9:00 00 00 00 00 00 00 00 DB
09D1:00 00 00 00 00 00 00 00 E3
09D9:00 00 00 00 00 00 00 00 EB
09E1:00 00 00 00 00 00 00 00 F3
09E9:00 00 00 00 00 00 00 00 FB
09F1:00 00 00 00 00 00 00 00 04
09F9:00 00 00 00 00 00 00 00 0C
0A01:A9 93 20 D2 FF A0 32 A9 90
0A09:02 8D 20 D0 8D 21 D0 A2 C7
0A11:0F BD 2A 08 9D 3C 06 BD 89
0A19:9F 0C 9D F0 05 A9 00 9D 2F
0A21:3C DA 9D F0 D9 CA 10 E9 D0
0A29:AD 00 DC 29 10 F0 15 CE 7F
0A31:53 CF D0 D3 88 D0 D0 AD 11
0A39:F0 0D D0 08 A9 00 8D 54 60
0A41:CE 4C 4A 0A A9 01 8D 54 7A
0A49:CE A9 93 20 D2 FF AD 16 AB
0A51:D0 09 10 8D 16 D0 A9 04 36
0A59:8D 22 D0 A9 00 8D 23 D0 BE
0A61:A9 00 8D 0E DC A9 33 85 56
0A69:01 A9 FF 85 FC 85 FE A9 66
0A71:D2 85 FF A9 22 85 FD A0 AE
0A79:00 B1 FE 91 FC C6 FC C6 B6
0A81:FE D0 F6 C6 FD C6 FF A5 45
0A89:FF C9 CF D0 EC A9 37 85 19
0A91:01 A9 01 8D 0E DC A9 18 D8
0A99:8D 18 D0 A2 87 BD 8C 0B 16
0AA1:9D F8 20 CA D0 F7 A9 FF 2D
0AA9:8D 0E D4 8D 0F D4 A9 80 1B
```

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0AB1:8D 12 D4 A0 00 AD 1B D4 77
0AB9:99 00 67 88 D0 F7 A2 1C D7
0AC1:A9 0A 9D F9 DA 9D 21 DB EB
0AC9:A9 24 9D F9 06 A9 22 9D C7
0AD1:21 07 CA 10 EB A2 17 A9 54
0AD9:2D 9D 53 04 A9 01 9D 53 76
0AE1:D8 8D 4A CE CA CA 10 EF 8D
0AE9:A2 1A A9 24 9D 42 05 A9 F6
0AF1:22 9D 6A 05 A9 0A 9D 42 0F
0AF9:D9 9D 6A D9 CA 10 EB A9 65
0B01:21 8D 6A 05 8D 21 07 A9 51
0B09:23 8D 84 05 8D 3D 07 A9 0E
0B11:26 8D 5C 05 8D 15 07 A9 F1
0B19:25 8D 42 05 8D F9 06 A2 C0
0B21:0D BD 0E 08 9D C1 05 9D 0B
0B29:39 06 BD 1C 08 9D E9 05 66
0B31:9D 61 06 A9 0A 9D C1 D9 ED
0B39:9D 39 DA 9D 61 DA 9D E9 3D
0B41:D9 CA 10 DD A9 D8 85 FD 90
0B49:A9 04 85 FF A9 1F 85 FE B9
0B51:85 FC A2 18 A0 08 A9 24 DB
0B59:91 FE A9 00 91 FC 88 10 CE
0B61:F5 A5 FE 18 69 28 85 FE 33
0B69:85 FC A5 FF 69 00 85 FF 8C
0B71:18 69 D4 85 FD CA 10 DC F8
0B79:20 0C 0C A0 00 A9 00 99 6E
0B81:00 CF 88 D0 F8 20 91 0C 21
0B89:4C E1 0C FF FF FF FF FF BF
0B91:FF FF FF 00 00 00 00 00 A7
0B99:00 00 00 AA EA FA FE E7 83
0BA1:39 0C 03 AA AA AA AA E7 9F
0BA9:B6 ED EE AA AB AF BF E7 A2
0BB1:B6 E4 D0 AA AA AA AA AA 21
0BB9:AA AA AA 00 02 0A 2A AA 5C
0BC1:AA AA AA 00 80 A0 A8 AA AF
0BC9:AA AA AA AA AA AA FF FF DF
0BD1:AA AA AA 00 00 00 FF FF 3D
0BD9:00 00 00 00 00 00 FF FF EF
0BE1:00 00 00 00 00 00 FF FF F7
0BE9:00 00 00 00 00 00 00 00 FF
0BF1:00 00 00 00 00 00 00 00 08
0BF9:00 00 FF 1C 1C 1C 1C 1C 77
0C01:00 00 00 08 1C 36 1C 36 C1
0C09:1C 08 00 A0 06 B9 B6 0C CB
0C11:99 90 07 B9 AF 0C 99 18 8F
0C19:07 B9 BD 0C 99 48 04 B9 4B
0C21:C4 0C 99 28 06 B9 CB 0C 0F
0C29:99 A0 06 A9 08 99 60 D9 D2
0C31:99 D8 D9 99 50 DA 99 C8 0B
0C39:DA 99 40 DB 99 B8 DB A9 FB
0C41:27 99 60 05 99 B8 07 99 07
0C49:40 07 99 C8 06 99 50 06 40
0C51:99 D8 05 B9 D2 0C 99 38 DA
0C59:05 B9 D9 0C 99 B0 05 88 80
0C61:10 AB 20 67 0C 60 A0 02 0C
0C69:AD 18 CF 99 62 D9 AD 19 E0
0C71:CF 99 52 DA AD 1A CF 99 DE
0C79:42 DB AD 1B CF 99 BA DB 47
0C81:AD 20 CF 99 DA D9 AD 3C E1
0C89:CF 99 CA DA 88 10 D9 60 8F
0C91:A2 18 A9 00 9D 00 D4 CA 97
0C99:10 FA 8D 00 CE 60 08 0F 41
0CA1:16 05 12 0A 05 14 20 20 C1
0CA9:20 20 20 20 20 20 06 09 76
0CB1:07 08 14 05 12 0D 09 13 0C
0CB9:13 0C 05 13 20 13 03 0F 92
0CC1:12 05 20 04 01 0D 01 07 AD
0CC9:05 13 14 01 12 07 05 14 86
0CD1:13 06 15 05 0C 28 29 2A 65
0CD9:17 01 12 0E 09 0E 07 00 6F
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0CE1:20 E4 14 A9 0B 8D 21 D0 02
0CE9:8D 31 CF A9 00 8D 26 D0 FC
0CF1:8D 20 D0 A9 0D 8D 2F CF 5A
0CF9:8D 18 CF A9 06 8D 2D CF 04
0D01:8D 3F CF A9 03 8D 15 D0 8F
0D09:A9 11 8D 1C D0 8D 10 CF 5C
0D11:A9 02 8D 04 CF 8D 05 CF 01
0D19:8D 07 CF 8D 08 CF 8D 09 32
0D21:CF 8D 25 D0 8D 55 CF A9 43
0D29:17 8D 1C CF 8D 2C CF A9 19
0D31:04 8D 57 CF A2 07 8E 1F 06
0D39:CF BD D0 0D 9D 27 D0 BD 7E
0D41:D8 0D 9D 00 D0 BD E8 0D 1B
0D49:9D F8 07 CA 10 EB AD F0 7A
0D51:0D D0 17 A2 07 8E 15 CE 9E
0D59:A9 00 9D 22 CE CA 10 F8 D8
0D61:A9 14 8D 4D CE A9 4B 8D 1D
0D69:70 CE 20 BA 14 20 68 0E 1F
0D71:20 68 0E 20 68 0E CE 01 93
0D79:D0 CE 03 D0 AD 01 D0 C9 F9
0D81:E0 D0 EA AD 1F D0 20 71 66
0D89:10 20 02 13 20 34 14 20 3F
0D91:C6 10 20 84 11 20 59 12 2D
0D99:20 FF 10 20 5D 11 20 2E 65
0DA1:10 20 B4 0E AD 31 CF 10 25
0DA9:03 20 F1 0D AD 35 CF F0 2F
0DB1:03 4C 96 0E AD 01 DC 29 68
0DB9:10 D0 05 A9 01 8D 0E CF 75
0DC1:AD 54 CE D0 C1 AD 00 DC 50
0DC9:29 10 D0 BA 4C A9 0E 07 6E
0DD1:00 01 00 0F 00 01 00 E2 04
0DD9:FC E1 FE 00 00 00 00 02 CC
0DE1:5F 01 60 00 00 00 00 22 1A
0DE9:22 27 27 25 25 27 27 00 2A
0DF1:A9 06 AD 15 D0 29 F0 F0 67
0DF9:01 60 A2 0F BD 7D 0E 9D 8F
0E01:D0 04 A9 01 9D D0 D8 8D 3B
0E09:F0 0D CA 10 EF A9 00 8D EE
0E11:32 CF 8D 02 CF 20 C7 13 AD
0E19:20 68 0E AD 00 CF C9 0F DD
0E21:90 F3 20 68 0E CE 03 D0 8F
0E29:CE 01 D0 D0 F5 68 68 EE 25
0E31:25 CE 20 BA 14 A0 12 A2 2D
0E39:0C 20 68 0E CA 8E 01 D4 B8
0E41:D0 F7 88 D0 F2 A9 01 8D AF
0E49:06 D4 8D 0D D4 CE 55 CF 7C
0E51:D0 FB 20 68 0E AD 00 DC 63
0E59:29 10 F0 05 CE 54 CF D0 B4
0E61:EC 20 FD 14 4C 01 0A A9 21
0E69:00 8D 32 CF A9 05 8D 33 DB
0E71:CF CE 32 CF D0 FB CE 33 B3
0E79:CF D0 F6 60 0D 09 13 13 5C
0E81:09 0F 0E 20 03 0F 0D 10 28
0E89:0C 05 14 05 07 01 0D 05 1B
0E91:20 0F 16 05 12 A2 08 BD 7D
0E99:8D 0E 9D 13 06 A9 01 9D 5B
0EA1:13 DA 8D 4C CF CA 10 EF 2E
0EA9:A9 00 8D F0 0D 8D 15 D0 F4
0EB1:4C 36 0E AD 15 D0 29 01 5D
0EB9:F0 09 CE 05 CF F0 18 EE 1C
0EC1:05 CF 60 A9 08 8D 18 CF 71
0EC9:8D 19 CF 8D 1A CF 8D 1B 0C
0ED1:CF 8D 20 CF 4C 67 0C EE 41
0ED9:05 CF A9 0D 8D 19 CF 8D 70
0EE1:1A CF 8D 1B CF 8D 3C CF 5F
0EE9:AD 00 CF C9 0C 90 05 A9 C9
0EF1:0E 8D 3C CF AD 00 CF CD D7
0EF9:12 CF F0 17 B0 10 A9 0A C5
0F01:8D 1B CF 4C 14 0F A9 08 A3
0F09:8D 1B CF 4C 14 0F A9 0E B1
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0F11:8D 1B CF AD 00 CF CD 0B 77
0F19:CF F0 0F B0 08 A9 0A 8D D0
0F21:1A CF 4C 2B 0F A9 0E 8D 45
0F29:1A CF AD 10 CF C9 0A B0 69
0F31:09 C9 05 B0 08 A9 0A 8D 7A
0F39:19 CF 4C 67 0C A9 0F 8D 8A
0F41:19 CF 4C 67 0C CE 1E CF 87
0F49:F0 01 60 AE 1D CF BD 43 FD
0F51:21 4A 9D 43 21 9D 44 21 A3
0F59:D0 09 AD 1D CF 18 69 08 63
0F61:8D 1D CF CE 1C CF AD 1C 0C
0F69:CF 30 0A C9 03 B0 05 A9 E7
0F71:0A 8D 18 CF 60 A9 01 8D 31
0F79:35 CF 60 AE 1F CF 30 08 BD
0F81:A9 00 8D 3B CF 4C AE 0F F5
0F89:A9 00 8D 1F CF AD 54 CE CC
0F91:F0 1B A9 02 8D 20 D0 20 F2
0F99:4C 0F CE 10 CF CE 10 CF 26
0FA1:CE 10 CF CE 10 CF 10 05 F6
0FA9:A9 01 8D 35 CF AE 1F CF 29
0FB1:BD BA 0F 8D 20 CF 4C 67 58
0FB9:0C 0A 0F 0F 0D 0D 0D 0D F6
0FC1:0D AD 2F CF CD 13 CF 90 9F
0FC9:60 AD 00 CF C9 0D B0 59 BD
0FD1:AD 05 D0 C9 50 B0 52 AD 56
0FD9:1F D0 29 04 F0 4B AD 2E 5F
0FE1:CF CD 50 CF D0 22 AD 71 3E
0FE9:CF C9 03 F0 10 A9 32 8D EA
0FF1:70 CE A9 11 8D 10 CF EE 7D
0FF9:25 CE 4C 06 10 A9 0A 8D 11
1001:4D CE EE 26 CE 20 BA 14 3C
1009:AE 2E CF A9 2E 9D 53 04 33
1011:A9 02 9D 53 D8 8D 46 CF C8
1019:EE 27 CE AD 15 D0 29 F3 61
1021:8D 15 D0 20 BA 14 CE 31 5E
1029:CF AD 1F D0 60 CE 04 CF A3
1031:F0 06 EE 04 CF 4C C2 0F AD
1039:EE 04 CF AD 11 CF 10 08 96
1041:AD 15 D0 29 CF 8D 15 D0 D9
1049:AD 2A CF C9 02 D0 20 AD A2
1051:05 D0 CD 09 D0 B0 18 AD 99
1059:15 D0 29 F3 8D 15 D0 A9 A8
1061:0F 8D 2B D0 A9 00 8D 2A 71
1069:CF EE 26 CE 20 BA 14 60 53
1071:AD 15 D0 29 10 F0 01 60 01
1079:AD 0A CF D0 FA A2 07 BD 28
1081:E0 0D 9D 08 D0 CA 10 F7 53
1089:CE 15 CE 10 03 EE 15 CE FD
1091:AE 15 CE BD B8 10 8D 14 39
1099:CF BD BF 10 8D 16 CF AD 1C
10A1:15 D0 09 30 8D 15 D0 A9 B0
10A9:0A 8D 11 CF A9 00 8D 0B C4
10B1:CF A9 0F 8D 29 D0 60 0A 36
10B9:0F 1E 32 3C 4B 78 5A 64 48
10C1:82 A0 BE D2 FF A9 FF 8D 84
10C9:0D CF AD 0B CF CD 00 CF 50
10D1:F0 07 B0 05 A9 FD 8D 0D FF
10D9:CF AD 08 D0 CD 00 D0 F0 5C
10E1:0B B0 12 AD 0D CF 29 F7 C2
10E9:8D 0D CF 60 AD 0D CF 29 7E
10F1:EF 8D 0D CF 60 AD 0D CF AF
10F9:29 FB 8D 0D CF 60 AD 1E A9
1101:D0 8D 0F CF 29 40 D0 03 BC
1109:4C 41 11 AD 0D D0 CD 01 E6
1111:D0 B0 03 4C 41 11 AD 0D A3
1119:D0 E9 0D CD 01 D0 90 03 0C
1121:4C 41 11 AD 12 CF CD 00 22
1129:CF F0 03 4C 41 11 A9 0C 42
1131:8D 20 D0 8D 21 D0 CE 10 0F
1139:CF 10 05 A9 01 8D 35 CF FA
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1141:AD 13 CF C9 04 B0 14 AD 4E
1149:05 D0 C9 D5 D0 0D AD 15 E3
1151:D0 29 F3 8D 15 D0 A9 00 BC
1159:8D 03 CF 60 AD 0F CF 29 75
1161:04 D0 01 60 AD 09 D0 69 7C
1169:0D CD 05 D0 B0 01 60 AD 2B
1171:13 CF CD 0B CF F0 01 60 20
1179:CE 11 CF A9 01 8D 46 CF 76
1181:4C AF 14 CE 17 CF F0 01 FF
1189:60 AD 16 CF 8D 17 CF AD 1D
1191:0E CF F0 0B AD 01 DC 8D 36
1199:0D CF A9 91 8D 16 CF AD 96
11A1:0D CF 29 08 F0 2A AD 0D 7C
11A9:CF 29 04 F0 0B A9 25 8D 64
11B1:FC 07 8D FD 07 4C E9 11 F3
11B9:A9 26 8D FC 07 8D FD 07 2D
11C1:AD 08 D0 C9 1E F0 06 CE 03
11C9:08 D0 CE 0A D0 4C E9 11 3B
11D1:A9 24 8D FC 07 8D FD 07 C4
11D9:AD 08 D0 C9 F7 F0 06 EE 0A
11E1:08 D0 EE 0A D0 4C E9 11 57
11E9:CE 08 CF F0 01 60 A9 03 5E
11F1:8D 08 CF AD 0D CF 29 02 AD
11F9:F0 03 4C 1E 12 A9 02 8D 89
1201:0C CF AD 0B CF C9 11 D0 1E
1209:01 60 EE 0B CF CE 09 D0 F0
1211:AD 09 D0 29 01 F0 03 CE 9B
1219:0A D0 4C 3B 12 CE 0C CF 67
1221:D0 23 EE 0C CF AD 0B CF 30
1229:F0 1B CE 0B CF EE 09 D0 34
1231:AD 09 D0 29 01 D0 03 EE 5B
1239:0A D0 AC 0B CF B9 47 12 E2
1241:E9 81 8D 0B D0 60 E2 E3 CE
1249:E4 E4 E5 E5 E6 E6 E7 E7 BE
1251:E8 E8 E9 E9 EA EA EB EB C6
1259:AD 0A CF D0 60 AD 15 D0 92
1261:29 10 F0 17 AD 0E CF F0 E3
1269:0B AD 01 DC 8D 0D CF A9 56
1271:23 8D 14 CF AD 0D CF 29 74
1279:10 F0 01 60 AD 0B CF C9 0B
1281:04 B0 01 60 A2 03 BD 08 9E
1289:D0 9D 0C D0 CA 10 F7 AD 40
1291:0D D0 69 0A 8D 0D D0 AD 2E
1299:0F D0 69 0A 8D 0F D0 A9 3B
12A1:01 8D 0A CF 8D 3A CF A9 86
12A9:27 8D FE 07 8D FF 07 AD 3D
12B1:15 D0 09 C0 8D 15 D0 AD D1
12B9:0B CF 8D 12 CF CE 09 CF C5
12C1:D0 3E CE 2B CF AD 2B CF C5
12C9:29 03 D0 19 AD 0C D0 CD FB
12D1:00 D0 F0 11 B0 09 EE 0C EC
12D9:D0 EE 0E D0 4C E6 12 CE E1
12E1:0C D0 CE 0E D0 AD 14 CF 30
12E9:8D 09 CF EE 0D D0 EE 0F 98
12F1:D0 D0 0D A9 00 8D 0A CF 09
12F9:AD 15 D0 29 3F 8D 15 D0 12
1301:60 CE 05 CF F0 01 60 AD A2
1309:70 CE 8D 05 CF 20 46 0F B7
1311:AD 54 CE D0 06 AD 57 CF 6F
1319:4C 1F 13 AD 00 DC 8D 02 FA
1321:CF 29 6F C9 6F F0 06 20 6F
1329:5C 13 4C 40 13 AD 00 CF EE
1331:F0 F5 EE 1F CF AD 1F CF 60
1339:C9 08 D0 03 CE 1F CF 20 43
1341:7C 0F AD 02 CF 29 08 F0 63
1349:53 AD 02 CF 29 04 F0 19 16
1351:A9 22 8D F8 07 8D F9 07 7F
1359:4C C7 13 CE 21 CF AD 21 AB
1361:CF 29 0F D0 03 CE 1F CF 0A
1369:60 A9 23 8D F8 07 8D F9 60
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1371:07 AD 00 D0 C9 1E F0 19 55
1379:CE 2D CF AD 2D CF 10 08 F7
1381:A9 07 8D 2D CF CE 2C CF A4
1389:CE 00 D0 CE 02 D0 4C C7 D1
1391:13 AD 57 CF 49 0C 8D 57 81
1399:CF 4C C7 13 A9 21 8D F8 CA
13A1:07 8D F9 07 AD 00 D0 C9 37
13A9:F5 F0 E6 EE 2D CF AD 2D 04
13B1:CF C9 08 D0 08 A9 00 8D B4
13B9:2D CF EE 2C CF EE 00 D0 16
13C1:EE 02 D0 4C C7 13 CE 07 ED
13C9:CF F0 01 60 A9 03 8D 07 B5
13D1:CF AD 02 CF 29 02 F0 03 BE
13D9:4C 04 14 A9 02 8D 01 CF 5C
13E1:AD 00 CF C9 11 D0 09 AD 01
13E9:57 CF 49 02 8D 57 CF 60 C2
13F1:EE 00 CF CE 01 D0 AD 01 1E
13F9:D0 29 01 F0 03 CE 02 D0 2A
1401:4C 21 14 CE 01 CF D0 21 11
1409:EE 01 CF AD 00 CF F0 1A F8
1411:CE 00 CF EE 01 D0 AD 01 31
1419:D0 29 01 D0 03 EE 02 D0 C9
1421:AC 00 CF B9 47 12 8D 03 D5
1429:D0 60 20 5C 13 20 E8 13 99
1431:4C 7C 0F AD 03 CF D0 46 9A
1439:AD 15 D0 29 01 F0 0F AD C1
1441:54 CE D0 03 4C 50 14 AD 0B
1449:00 DC 29 10 F0 01 60 A2 BD
1451:03 BD 00 D0 9D 04 D0 CA E0
1459:10 F7 AD 2C CF 8D 2E CF E0
1461:A9 01 8D 03 CF 8D 3A CF 79
1469:A9 27 8D FA 07 8D FB 07 FE
1471:AD 15 D0 09 0C 8D 15 D0 F1
1479:AD 00 CF 8D 13 CF CE 04 C4
1481:CF D0 2A AD 4D CE 8D 04 AA
1489:CF CE 07 D0 CE 05 D0 D0 38
1491:1C A9 00 8D 03 CF AD 15 D2
1499:D0 29 F3 8D 15 D0 AE 2E 43
14A1:CF BD 53 04 C9 2E D0 05 79
14A9:A9 20 9D 53 04 60 A9 02 8E
14B1:8D 2B D0 8D 2A CF EE 28 F4
14B9:CE A2 06 BD 23 CE C9 0A 80
14C1:90 08 A9 00 9D 23 CE FE 7F
14C9:22 CE CA 10 EE A0 06 B9 D0
14D1:23 CE 09 30 99 70 04 A9 A3
14D9:07 99 48 D8 99 70 D8 88 4B
14E1:10 ED 60 78 AD 14 03 8D 72
14E9:12 15 AD 15 03 8D 13 15 F0
14F1:A9 0C 8D 14 03 A9 15 8D 5B
14F9:15 03 58 60 78 AD 12 15 32
1501:8D 14 03 AD 13 15 8D 15 4F
1509:03 58 60 20 16 15 4C 31 A7
1511:EA 00 00 00 00 AD 35 CF A1
1519:F0 03 EE 20 D0 CE 4E CF 8A
1521:D0 2D AC 50 CF A9 01 99 5A
1529:53 D8 EE 4F CF AC 4F CF A5
1531:B9 00 67 29 0F 69 04 8D 6B
1539:50 CF A8 AD 4F CF 29 07 82
1541:D0 05 A9 06 4C 4A 15 A9 0A
1549:03 99 53 D8 8D 71 CF CE F3
1551:49 CF D0 0F A9 00 8D 20 A7
1559:D0 A9 0B 8D 21 D0 A9 0F 3F
1561:8D 49 CF AD 00 CE D0 03 59
1569:4C AA 16 C9 01 F0 51 AD DF
1571:4C CF D0 1A 20 E0 15 AD CD
1579:3A CF C9 01 D0 03 20 F9 CA
1581:15 AD 43 CF C9 01 D0 03 FD
1589:20 25 16 4C 48 16 AD 4C D6
1591:CF C9 06 F0 22 A2 06 8E 1C
1599:4C CF BD E1 16 9D 00 D4 AF
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15A1:9D 07 D4 CA 10 F4 A9 80 CB
15A9:8D 04 D4 8D 0B D4 A9 81 8F
15B1:8D 04 D4 8D 0B D4 60 A9 2D
15B9:80 8D 04 D4 8D 0B D4 60 F7
15C1:EE 01 CE F0 14 AD 01 CE B4
15C9:8D 00 D4 29 07 D0 09 EE 64
15D1:02 CE AD 02 CE 8D 01 D4 0A
15D9:60 A9 02 8D 00 CE 60 AD 61
15E1:02 CF C9 7F F0 0C C9 6F EC
15E9:F0 0D A9 0F 8D 01 D4 4C 5C
15F1:F8 15 A9 05 8D 01 D4 60 DD
15F9:AD 43 CF F0 01 60 A9 08 B9
1601:8D 41 CF 8D 42 CF 8D 44 C7
1609:CF A9 01 8D 43 CF A2 06 25
1611:BD E8 16 9D 07 D4 CA 10 24
1619:F7 A9 80 8D 0B D4 A9 81 15
1621:8D 0B D4 60 AD 42 CF 69 F6
1629:0A 8D 42 CF 8D 08 D4 CE 08
1631:41 CF D0 12 A9 0F 8D 08 D9
1639:D4 A9 10 8D 0B D4 A9 00 14
1641:8D 3A CF 8D 43 CF 60 AD 5D
1649:46 CF F0 31 C9 03 F0 2E 28
1651:C9 01 F0 3B A9 80 8D 0B E9
1659:D4 A2 06 BD EF 16 9D 07 4F
1661:D4 CA 10 F7 A9 02 8D 08 A4
1669:D4 A9 F8 8D 05 CD A9 03 18
1671:8D 46 CF A9 80 8D 0B D4 AF
1679:A9 81 8D 0B D4 60 A9 80 39
1681:8D 0B D4 A9 00 8D 46 CF FE
1689:8D 43 CF 8D 3A CF 60 A9 9B
1691:80 8D 0B D4 A2 06 BD EF A8
1699:16 9D 07 D4 CA 10 F7 A9 96
16A1:06 8D 08 D4 A9 F6 4C 6C B0
16A9:16 A9 01 8D 00 CE 8D 02 9C
16B1:CE A9 96 8D 01 CE A2 06 E9
16B9:BD E1 16 9D 00 D4 CA 10 D2
16C1:F7 A9 03 8D 15 D4 A9 01 DD
16C9:8D 16 D4 A9 11 8D 17 D4 39
16D1:A9 1F 8D 18 D4 A9 80 8D A9
16D9:04 D4 A9 81 8D 04 D4 60 11
16E1:FF 01 05 09 80 07 FC FF 99
16E9:07 09 09 80 07 78 FF 07 26
16F1:09 09 80 07 F7 00 00 00 25
```

Mike Sedlezsky lives in Mississauga, Ontario, Canada. ❐

ADD CHECK

Daniel Lightner

This handy utility checks any program stored on a disk for the program's starting and ending addresses. *Add Check,* which is short for *Address Checker,* also gives the number of bytes the program occupies.

Add Check is written in machine language. To enter it, use *MLX,* our machine language entry program. See "Typing Aids" elsewhere in this section. When *MLX* prompts, respond with the following values.

Starting address: 0801
Ending address: 0A99

Be sure to save a copy of the program before exiting *MLX*.

Add Check loads and runs like a BASIC program. Provide the program name and make sure the disk with that file is in drive 8; then hit Return.

Add Check checks the disk and drive to make sure they're ready; then it reads the file and returns the starting address and the ending address plus 1. The number of bytes is then displayed. If you wish to check another program, just type RUN again and press Return.

ADD CHECK

```
0801:0B 08 0A 00 9E 32 30 36 2E
0809:32 00 00 00 00 A9 00 8D 66
0811:20 D0 8D 21 D0 8D B2 02 4D
0819:A9 93 20 D2 FF 20 D7 09 4D
0821:20 E5 09 A0 00 B9 52 0A 7B
0829:20 D2 FF C8 C0 0B D0 F5 54
0831:20 F3 09 20 73 09 A9 03 87
0839:A2 93 A0 0A 20 BD FF A9 D5
0841:0F A2 08 A0 0F 20 BA FF FA
0849:20 C0 FF AC 34 03 A2 00 57
0851:BD 96 0A 99 35 03 EE 34 88
0859:03 C8 E8 E0 05 D0 F1 CE 66
0861:34 03 AD FF FF FF FF FF 02
0869:FF FF 7B 11 F2 FF FF FF 91
0871:FF FF FF 7F 11 FF AF 11 72
0879:F2 FB FF FF 11 FF F1 FF 6E
0881:BC 11 FF B1 11 FF FF 11 E8
0889:FF B1 11 FF FF 10 B3 FF CF
0891:FF FB FF B1 11 FF FF 10 54
0899:B2 FB FF F6 FF FF FF F3 65
08A1:10 3B FF FF FF 3C FF 17 90
08A9:48 08 FF 66 F8 FF 08 00 1E
08B1:88 6A 66 81 9A 6F FF 7C 94
08B9:FF 76 81 9A 6F FF FF FF BC
08C1:7B FF 88 FF 58 08 FF 5C DF
08C9:01 88 80 81 9A 6F FF 17 4E
08D1:58 00 FF 8C FF 58 01 17 51
08D9:5C 00 FF 88 FF 5C 08 FF 22
08E1:8E 76 FF 8C FF 77 8E 7A 15
08E9:FF 88 FF 7A 81 4E 6F FF E7
08F1:81 F8 0C 9F FF FF 08 80 0D
08F9:88 6A 67 FF 02 20 C3 FF ED
0901:A9 0F 20 C3 FF A5 FB 8D 08
0909:BC 02 A5 FC 8D BD 02 A9 8F
0911:0D 20 D2 FF AD B2 02 C9 12
0919:FF F0 56 A0 00 B9 5D 0A E7
0921:20 D2 FF C8 C0 13 D0 F5 6E
0929:A6 FB A5 FC 20 CD BD A9 6F
0931:0D 20 D2 FF 20 D2 FF A0 19
0939:00 B9 70 0A 20 D2 FF C8 7D
0941:C0 11 D0 F5 A6 FD A5 FE E8
0949:20 CD BD A9 0D 20 D2 FF BF
0951:20 D2 FF A0 00 B9 81 0A 26
0959:20 D2 FF C8 C0 12 D0 F5 A2
0961:AD BB 02 AE BA 02 20 CD 50
0969:BD A9 0D 20 D2 FF 20 D2 12
0971:FF 60 A0 00 A9 00 8D 34 4C
0979:03 20 E4 FF C9 00 F0 F9 DB
0981:C9 14 F0 39 C9 0D F0 20 B3
0989:C9 7B B0 ED C9 20 90 E9 2E
0991:C9 22 F0 E5 C9 2C F0 E1 50
0999:AC 34 03 C0 14 F0 DA 20 B5
09A1:D2 FF 20 B4 09 4C 7A 09 E3
09A9:AC 34 03 C0 00 F0 CA 20 05
09B1:D2 FF 60 AC 34 03 99 35 1A
09B9:03 EE 34 03 60 AC 34 03 E0
09C1:C0 01 B0 03 4C 7A 09 20 39
09C9:D2 FF 38 AD 34 03 E9 01 A9
09D1:8D 34 03 4C 7A 09 A0 00 16
09D9:B9 06 0A 20 D2 FF C8 C0 76
09E1:4C D0 F5 60 A9 0D 20 D2 A7
09E9:FF 20 D2 FF A9 96 20 D2 19
09F1:FF 60 A9 0D 20 D2 FF 20 8E
09F9:D2 FF A9 9A 20 D2 FF A9 4A
0A01:3E 20 D2 FF 60 0D 41 44 94
0A09:44 2E 20 43 48 45 43 4B 2C
0A11:0D 43 4F 50 59 52 49 47 59
0A19:48 54 20 31 39 39 31 20 AE
0A21:43 4F 4D 50 55 54 45 0D EC
0A29:50 55 42 4C 49 43 41 54 F5
0A31:49 4F 4E 53 20 49 4E 54 D3
0A39:4C 20 4C 54 44 0D 41 4C 6F
0A41:4C 20 52 49 47 48 54 53 B9
0A49:20 52 45 53 45 52 56 45 45
0A51:44 46 49 4C 45 20 4E 41 8F
0A59:4D 45 20 3F 96 53 54 41 49
0A61:52 54 49 4E 47 20 41 44 43
0A69:44 52 45 53 53 20 9A 96 F8
0A71:45 4E 44 49 4E 47 20 41 E9
0A79:44 44 52 45 53 53 20 9A 22
0A81:96 4E 55 4D 42 45 52 20 DF
0A89:4F 46 20 42 59 54 45 53 F8
0A91:20 9A 49 2F 4F 2C 50 2C 70
0A99:52 00 00 00 00 00 00 00 D6
```

Daniel Lightner, a frequent contributor, lives in Sidney, Montana. □

SONG MACHINE

Daniel Lightner

You don't have to know anything about musical theory in order to make music with this program and a 64. *Song Machine* is a program for designing sound and music or for entering music out of songbooks and playing it back. With the 64's three voices, you can enter chords as well, producing some rather sophisticated arrangements.

Song Machine is written in machine language. To enter it, use *MLX*, our machine language entry program. See "Typing Aids," found elsewhere in this section. When *MLX* prompts, respond with the following values.

Starting address: 0801
Ending address: 2277

Be sure to save a copy of the program before exiting *MLX*.

Making Music

When you're ready to use *Song Machine,* load and run it as you would a BASIC program. Two staffs, a bass clef, and a treble clef will appear on the screen. Up the left side of the screen are the names of the notes that correspond to the various lines and spaces of the musical staffs. These notes represent the range of pitch for each level of the staff.

On the right side of the screen is an area that is framed off from the rest of the staff. This is where you edit notes. At the top of this area, you will see a note with two little flags extending from its stem. This is a sixteenth note. Press the N key, and you can scroll through the whole range of nine notes, five rests, and the flat and sharp accidentals. Hold the Shift key down as you press N to scroll back through them. Now scroll back to the sixteenth note.

Below the staffs you'll see a line indicating which of the 64's three voices you are editing and the instrument that the voice is set to emulate. Press O to toggle the voice on and off. Turn the voice on now.

Play a Note

Use the cursor key to move the note up and down the staff. Make sure the volume on your monitor is turned up; then press P to hear what the note sounds like. Move the note and try again. Now use the N and P keys to scroll through the notes while playing them. Notice the different time values for the different types of notes; these time values and pitch values are based on figures found in *Commodore 64 Programmer's Reference Guide.*

When you first run the program, you'll see the number 0 at the top left of the screen. This indicates the number of the note being edited. Using the Cursor Right key, move the note off the work area. The note now being edited is number 1. There are 999 places per voice reserved for notes, from 0–998.

Now, using the steps mentioned above, adjust the note and move it off the work area. Repeat this process several more times. Hold down the Shift key and press P. The notes will play up to the last one before the work area. Use the Cursor Left key to move back a few notes and play them again. Press the space bar if you wish to abort playing. There are seven different instruments from which to select. Press the I key to change them.

To move to another voice, press V. Remember that you cannot hear a voice until you turn it on and that if another voice is still on, you'll hear it, too. The voices will play only up to the number of notes indicated for each voice.

Sharps and Flats

There is no time lapse when using the sharp and flat accidentals. If a sharp, for instance, is placed on any F line, then all the notes on any F line will become sharp. Should *Song Machine* encounter another sharp accidental on the F line, notes on these lines will be returned to normal. To return the F to sharp, another sharp accidental must then be entered. Flats toggle on and off the same way.

When played, rests are silent, but their values correspond with those of notes of the same length. For example, a quarter rest will hold for the same length of time as a quarter note. A half rest will hold for the same length as a half note, and so on.

Copy a Range

Music quite often is repetitive, using the same range of notes again and again. Rather than having to reenter repetitive passages manually, you can use *Song Machine's* special command for copying them. To enter the Copy mode, press the Shift key and the C key simultaneously. Below the staffs a prompt appears indicating that the computer is ready for input.

First, enter a V and then either a 1, 2, or 3 for the voice that you'll be copying from. Next, press the colon (:) followed by a number less than 999 to indicate the note where you'll begin copying. Then press the Minus key (-) followed by another number less than 999 to indicate the last note in the copy range. Now enter TOV and the number 1, 2, or 3 for the voice that you want the range to be copied to. Then type another colon followed by a number to indicate where you want the range to start. The press Return.

The following example is how a typical copy line might look.

The Song Machine notes, rests, and accidentals

𝅘𝅥𝅰	Thirty-second note
𝅘𝅥𝅯	Sixteenth note
𝅘𝅥𝅮	Eighth note
𝅘𝅥𝅮.	Dotted eighth note
𝅘𝅥	Quarter note
𝅘𝅥.	Dotted quarter note
𝅗𝅥	Half note
𝅗𝅥.	Dotted half note
𝅝	Whole note
𝄻	Whole rest
𝄼	Half rest
𝄽	Quarter rest
𝄾	Eighth rest
𝄿	Sixteenth rest
♯	Sharp
♭	Flat

V1:0-467TOV3:734

This example copies the range of notes 0–467 of voice 1 and places them in voice 3 starting at note 734.

To copy a range of notes within the same voice, you might have a line that looks something like the following.

V3:0-15TOV3:16

Type a $ at any time to list the disk directory. Pause the listing by hitting any key. The Run/Stop key aborts a listing.

Hold Shift and press S or L to enter the Save or Load mode. Just give the desired filename and press Return. The program saves the same amount of memory each time whether it's used or not.

To clear the current voice, press Clr/Home. Press Shift–Clr/Home to clear all the voices. When you're ready to stop, press Shift-Q to quit the program.

COMMAND TABLE

N and Shift-N	Scroll through notes
V	Change voices
I	Change instruments
P	Play edit note
Shift-P	Play string of notes
O	Toggle voice on/off
Space bar	Abort Play mode
Shift-C	Copy mode
Shift-S	Save file
Shift-L	Load file
Clr/Home	Clear active voice
Shift–Clr/Home	Clear all voices
$	Directory
Cursor Up/Down	Move notes up/down staff
Cursor Left/Right	Move note pointer left/right
V2:0-15TOV2:16	Copy format
Shift-Q	Quit

SONG MACHINE

```
0801:22 08 0A 00 9E 32 30 38 BB
0809:38 20 53 4F 4E 47 20 4D B9
0811:41 43 48 49 4E 45 20 31 29
0819:39 39 31 20 20 20 20 20 1E
0821:00 00 00 EA 19 00 80 AD 57
0829:24 08 8D B2 02 AD 25 08 43
0831:8D B3 02 AD 26 08 85 FD 6A
0839:AD 27 08 85 FE A9 8E 85 84
0841:FB A9 08 85 FC 18 A5 FB A2
0849:6D B2 02 8D B4 02 A5 FC CB
0851:6D B3 02 8D B5 02 A0 00 15
0859:B1 FB 91 FD 18 A5 FB 69 0C
```

```
0861:01 85 FB A5 FC 69 00 85 40
0869:FC 18 A5 FD 69 01 85 FD EA
0871:A5 FE 69 00 85 FE A5 FB B0
0879:CD B4 02 F0 03 4C 88 08 4F
0881:A5 FC CD B5 02 F0 03 4C DE
0889:59 08 6C 26 08 D8 AD 18 4F
0891:D0 29 F0 69 0C 8D 18 D0 A0
0899:78 A5 01 29 FB 85 01 A0 9A
08A1:00 B9 00 D0 99 00 30 B9 14
08A9:FF D0 99 FF 30 B9 FE D1 59
08B1:99 FE 31 B9 FD D2 99 FD 7C
08B9:32 B9 FC D3 99 FC 33 B9 0F
08C1:FB D4 99 FB 34 B9 FA D5 4C
08C9:99 FA 35 B9 F9 D6 99 F9 FF
08D1:36 C0 FF F0 04 C8 4C 14 2C
08D9:80 A5 01 09 04 85 01 58 D4
08E1:A9 80 85 FB A9 32 85 FC 75
08E9:A0 00 B9 2D 95 91 FB C8 08
08F1:C0 48 D0 F6 A9 00 8D E5 4C
08F9:03 A9 00 8D 21 D0 8D 20 56
0901:D0 AD 14 03 8D 11 03 AD FD
0909:15 03 8D 12 03 78 A9 23 A9
0911:8D 14 03 A9 84 8D 15 03 71
0919:58 20 49 83 A9 00 8D BF E8
0921:02 8D C0 02 8D C1 02 8D D4
0929:B7 02 8D B8 02 8D F3 03 06
0931:A0 00 A9 00 99 21 4E C8 7F
0939:C0 06 D0 F6 A0 00 A9 00 0F
0941:99 00 D4 C8 C0 19 D0 F6 4A
0949:20 20 8F A0 00 A9 C0 99 31
0951:F8 07 C8 C0 08 D0 F6 A0 D8
0959:00 A9 07 99 27 D0 C8 C0 1F
0961:08 D0 F6 A0 00 A9 46 99 61
0969:01 D0 C8 C8 C0 10 D0 F5 B3
0971:A0 00 A2 00 BD D5 95 99 32
0979:00 D0 C8 C8 E8 E0 09 D0 13
0981:F3 A0 00 B9 DE 95 99 A7 79
0989:02 C8 C0 0C D0 F5 A9 01 5A
0991:8D C2 02 8D C3 02 A9 02 AF
0999:8D C4 02 A9 03 8D C5 02 5A
09A1:20 DD 8E 20 66 83 20 39 C9
09A9:8F A9 0D 20 D2 FF 20 D2 3B
09B1:FF 20 D2 FF A0 00 B9 ED 8C
09B9:94 20 D2 FF C8 C0 40 D0 13
09C1:F5 A0 00 20 A0 84 20 E4 35
09C9:FF C9 1D F0 5F C9 9D F0 4F
09D1:5E C9 11 F0 60 C9 91 F0 F4
09D9:59 C9 4E F0 5B C9 CE F0 74
09E1:5A C9 56 F0 5C C9 49 F0 FA
09E9:5B C9 4F F0 39 C9 50 F0 97
09F1:56 C9 D0 F0 49 C9 C3 F0 B4
09F9:54 C9 13 F0 1D C9 93 F0 42
0A01:1F C9 D3 F0 0F C9 CC F0 CA
0A09:0E C9 24 F0 46 C9 D1 F0 18
0A11:18 4C 39 81 4C 66 82 4C D0
0A19:8F 82 20 05 83 4C 36 81 25
0A21:20 49 83 4C 36 81 4C F7 15
0A29:89 4C E2 FC 4C 87 88 4C 1F
0A31:25 89 4C C9 89 4C CF 89 07
0A39:4C 0B 8B 4C B2 8A 4C C3 88
0A41:8C 4C 9A 8A 4C 47 8A 20 5F
0A49:69 8B 4C 36 81 20 2D 8F 58
0A51:4C 36 81 20 CC FF A5 CB C8
0A59:C9 40 D0 FA A9 00 8D 15 A9
0A61:D0 A9 01 8D F3 03 A9 93 D3
0A69:20 D2 FF A9 01 A2 08 A0 20
0A71:00 20 BA FF A9 24 8D 35 13
0A79:03 A9 01 A2 35 A0 03 20 16
0A81:BD FF 20 C0 FF A2 01 20 31
0A89:C6 FF 20 60 82 20 52 82 C6
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0A99:A5 CB C9 3F F0 2B A5 CB EB
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0AA9:40 F0 FA A9 0D 20 D2 FF A2
0AB1:20 E4 FF AA 20 E4 FF 20 6E
0AB9:23 87 A9 20 20 D2 FF 20 E4
0AC1:E4 FF F0 C9 20 D2 FF D0 20
0AC9:F6 A9 01 20 C3 FF 20 CC 11
0AD1:FF A5 CB C9 40 F0 FA A9 CA
0AD9:00 8D F3 03 4C 16 81 20 DD
0AE1:E4 FF 85 FB 20 E4 FF 05 72
0AE9:FB 60 20 60 82 20 E4 FF 7C
0AF1:4C E4 FF 20 39 8F A0 00 B0
0AF9:B9 E7 94 20 D2 FF C8 C0 62
0B01:06 D0 F5 20 60 8F 20 52 E2
0B09:8F A0 00 B9 C6 02 99 21 3D
0B11:4E C8 C0 06 D0 F5 20 C0 58
0B19:82 4C E3 82 20 39 8F A0 CD
0B21:00 B9 E1 94 20 D2 FF C8 40
0B29:C0 06 D0 F5 20 60 8F 20 5C
0B31:52 8F 20 C0 82 20 FC 82 75
0B39:A0 00 B9 21 4E 99 C6 02 51
0B41:C8 C0 06 D0 F5 A9 00 8D 9D
0B49:F3 03 4C 36 81 20 CC FF 2D
0B51:A9 00 8D 15 D0 85 9D A9 C0
0B59:00 A2 08 A0 01 20 BA FF 21
0B61:AD 34 03 A2 35 A0 03 20 38
0B69:BD FF A9 01 8D F3 03 60 46
0B71:A9 B0 85 FB A9 36 85 FC 27
0B79:A9 FB A2 29 A0 4E 20 D8 A1
0B81:FF A9 00 8D F3 03 4C 36 55
0B89:81 A9 00 A2 FF A0 FF 4C C3
0B91:D5 FF A0 00 AE C2 02 CA F5
0B99:BD 99 95 85 FB BD 9C 95 A5
0BA1:85 FC A9 19 91 FB 18 A5 D2
0BA9:FB 69 01 85 FB A5 FC 69 6A
0BB1:00 85 FC A5 FB DD 9F 95 4F
0BB9:F0 03 4C 15 83 A5 FC DD 6E
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0BC9:FB BD A8 95 85 FC A9 00 2F
0BD1:91 FB C8 91 FB 60 AD C2 61
0BD9:02 48 A9 01 8D C2 02 20 E3
0BE1:05 83 EE C2 02 20 05 83 83
0BE9:EE C2 02 20 05 83 68 8D FE
0BF1:C2 02 60 20 12 84 A9 1F 0D
0BF9:20 D2 FF A9 0D 20 D2 FF FD
0C01:20 D2 FF 20 D2 FF 20 FE B5
0C09:83 A9 0D 20 D2 FF 20 FE C6
0C11:83 A0 00 A9 BE 85 FB A9 5B
0C19:04 85 FC 85 FE A9 C1 85 34
0C21:FD A9 78 85 30 A9 04 85 BF
0C29:31 A9 78 85 32 A9 D8 85 1B
0C31:33 A2 00 BD FC 93 91 FB BC
0C39:BD 09 94 91 FD BD 82 95 9F
0C41:91 30 A9 0A 91 32 C8 BD A8
0C49:75 95 91 30 A9 0E 91 32 91
0C51:88 18 A5 FB 69 28 85 FB 1B
0C59:A5 FC 69 00 85 FC 18 A5 A6
0C61:FD 69 28 85 FD A5 FE 69 1E
0C69:00 85 FE 18 A5 30 6B FF 09
0C71:FF FF FF FF C2 FF FF FF 9F
0C79:63 FF FF C3 FF FF FF FF 7F
0C81:FF C2 FF FF FF FF FF FB 46
0C89:AF F3 FF FF FF FF FF F6 6D
0C91:90 81 60 6F FF F0 FF F0 0A
0C99:FF FF 98 FF F1 A6 90 88 98
0CA1:9B FF 88 81 FF EB FF 27 87
0CA9:FF C1 01 02 FF 0F 1D 22 0B
0CB1:57 F0 FF 7F FF FF 22 2D 1B
0CB9:03 FF 77 CA FF 22 2E A2 76
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0CC9:77 40 FF 22 2E A2 FF 31 FC
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0CD9:FF 16 FF 22 52 A5 16 77 66
0CE1:CA FF 22 2F FF 31 42 57 37
0CE9:CA FF 22 2F FF 36 77 00 66
0CF1:FF 22 2F 06 26 CA 8E D8 2B
0CF9:02 E0 00 F0 1E AE D9 02 BB
0D01:E0 00 F0 20 CA 8E D9 02 F1
0D09:E0 00 F0 18 AE EF 02 6C D8
0D11:11 03 AE D4 02 8E 04 D4 BE
0D19:4C 61 84 AE D5 02 8E 0B 0C
0D21:D4 4C 70 84 AE D6 02 8E 72
0D29:12 D4 4C 7F 84 20 B8 84 9D
0D31:20 5E 85 A9 00 8D F1 02 5A
0D39:20 B9 85 20 32 85 20 D8 45
0D41:86 20 6B 87 60 AD C2 02 CD
0D49:C9 01 F0 29 C9 02 F0 4A BB
0D51:AD CA 02 8D CC 02 AD CB A3
0D59:02 8D CD 02 AD AF 02 8D 6F
0D61:B3 02 AD B0 02 8D B4 02 48
0D69:AD B1 02 8D B5 02 AD B2 A3
0D71:02 8D B6 02 60 AD C6 02 30
0D79:8D CC 02 AD C7 02 8D CD D7
0D81:02 AD A7 02 8D B3 02 AD 0A
0D89:A8 02 8D B4 02 AD A9 02 91
0D91:8D B5 02 AD AA 02 8D B6 2A
0D99:02 60 AD C8 02 8D CC 02 F0
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0DA9:02 8D B3 02 AD AC 02 8D 70
0DB1:B4 02 AD AD 02 8D B5 02 EA
0DB9:AD AE 02 8D B6 02 60 AD 9B
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0DC9:F0 14 AD C1 02 C9 01 F0 5D
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0DD9:01 F0 0D 4C 15 87 AD C0 F9
0DE1:02 C9 01 F0 03 4C 15 87 99
0DE9:4C 07 87 A9 10 85 D6 A9 65
0DF1:00 85 D3 20 6C E5 20 FA 20
0DF9:86 A9 10 85 D6 A9 00 85 FE
0E01:D3 20 6C E5 A0 00 B9 94 08
0E09:93 20 D2 FF C8 C0 06 D0 77
0E11:F5 AD C2 02 C9 01 F0 12 52
0E19:C9 02 F0 1C A0 00 B9 EC DF
0E21:93 20 D2 FF C8 C0 07 D0 91
0E29:F5 60 A0 00 B9 E2 93 20 0D
0E31:D2 FF C8 C0 05 D0 F5 60 93
0E39:A0 00 B9 E7 93 20 D2 FF 1E
0E41:C8 C0 05 D0 F5 60 AD C2 EE
0E49:02 C9 01 F0 0A C9 02 F0 74
0E51:0C AD C5 02 4C D3 85 AD 22
0E59:C3 02 4C D3 85 AD C4 02 0D
0E61:C9 01 F0 18 C9 02 F0 27 A1
0E69:C9 03 F0 36 C9 04 F0 45 32
0E71:C9 05 F0 54 C9 06 F0 63 C2
0E79:C9 07 F0 72 A9 AE 85 30 C4
0E81:A9 93 85 31 A9 16 85 32 FD
0E89:A9 94 85 33 4C 71 86 A9 62
0E91:A7 85 30 A9 93 85 31 A9 42
0E99:1C 85 32 A9 94 85 33 4C 73
0EA1:71 86 A9 9A 85 30 A9 93 CA
0EA9:85 31 A9 22 85 32 A9 94 09
0EB1:85 33 4C 71 86 A9 B5 85 C9
0EB9:30 A9 93 85 31 A9 28 85 29
0EC1:32 A9 94 85 33 4C 71 86 80
0EC9:A9 C0 85 30 A9 93 85 31 76
0ED1:A9 2E 85 32 A9 94 85 33 FF
0ED9:4C 71 86 A9 CB 85 30 A9 62
0EE1:93 85 31 A9 34 85 32 A9 AF
0EE9:94 85 33 4C 71 86 A9 D4 AA
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0F19:0D B1 30 C9 2A F0 07 20 10
0F21:D2 FF C8 4C 8C 86 60 AD 73
0F29:C2 02 C9 02 F0 15 C9 03 F4
0F31:F0 22 A9 02 85 FB A9 D4 E9
0F39:85 FC A9 D4 85 FD A9 02 55
0F41:85 FE 60 A9 09 85 FB A9 88
0F49:D4 85 FC A9 D5 85 FD A9 D7
0F51:02 85 FE 60 A9 10 85 FB 4C
0F59:A9 D4 85 FC A9 D6 85 FD B3
0F61:A9 02 85 FE 60 A9 02 85 A8
0F69:D6 A9 00 85 D3 20 6C E5 93
0F71:20 FA 86 A9 02 85 D6 A9 47
0F79:00 85 D3 20 6C E5 AE CC 9A
0F81:02 AD CD 02 4C 23 87 A0 84
0F89:00 A9 20 20 D2 FF C8 C0 01
0F91:20 D0 F6 60 A0 00 B9 F3 45
0F99:93 20 D2 FF C8 C0 04 D0 06
0FA1:F5 60 A0 00 B9 F7 93 20 DB
0FA9:D2 FF C8 C0 05 D0 F5 60 0E
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0FC9:95 90 0F 8D E3 03 AD E2 FA
0FD1:03 FD 8E 95 8D E2 03 C8 E2
0FD9:D0 E3 98 CA F0 11 C9 B0 29
0FE1:F0 03 8D E4 03 2C E4 03 CE
0FE9:30 05 AD E5 03 F0 05 29 84
0FF1:7F 20 D2 FF CA 10 C4 60 B2
0FF9:AD CD 02 C9 00 D0 0A AD 44
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1009:87 A9 07 8D CE 02 AC CE B7
1011:02 B9 4F 93 8D 15 D0 18 3E
1019:AD B5 02 6D CC 02 85 FB 0A
1021:AD B6 02 6D CD 02 85 FC 5B
1029:38 A5 FB ED CE 02 85 FB B2
1031:A5 FC E9 00 85 FC 18 A9 9A
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1041:CC 02 85 FD AD B4 02 6D 8A
1049:CD 02 85 FE 38 A5 FD ED B3
1051:CE 02 85 FD A5 FE E9 00 E6
1059:85 FE 38 A9 FF ED CE 02 F4
1061:85 30 A9 07 E9 00 85 31 81
1069:AC CE 02 A2 00 A1 FB C9 46
1071:19 F0 48 18 69 80 81 30 65
1079:18 A5 FB 69 01 85 FB A5 E0
1081:FC 69 00 85 FC 18 A5 30 96
1089:69 01 85 30 A5 31 69 00 17
1091:85 31 B9 57 93 85 26 A1 0E
1099:FD C9 19 F0 26 AA 18 A5 0F
10A1:FD 69 01 85 FD A5 FE 69 81
10A9:00 85 FE BD 5F 93 A2 00 75
10B1:81 26 C0 01 90 04 88 4C 36
10B9:DE 87 60 AD B8 02 81 FB DE
10C1:4C E6 87 AD B7 02 81 FD 54
10C9:4C 10 88 AD C2 02 C9 01 B2
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10D9:AF 02 6D CC 02 85 FB AD 98
10E1:B0 02 6D CD 02 85 FC 4C D1
10E9:82 88 18 AD A7 02 6D CC 38
10F1:02 85 FB AD A8 02 6D CD C4
10F9:02 85 FC 4C 82 88 18 AD F4
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1129:03 4C B1 88 AD CA 02 C9 05
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1139:8D CA 02 4C 36 81 18 AD 6F
1141:CA 02 69 01 8D CA 02 AD CF
1149:CB 02 69 00 8D CB 02 4C EA
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1169:8D C7 02 4C 36 81 18 AD DE
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1179:C7 02 69 00 8D C7 02 4C 09
1181:36 81 AD C9 02 C9 03 F0 9F
1189:03 4C 11 89 AD C8 02 C9 59
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1199:8D C9 02 4C 36 81 18 AD 8F
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11A9:C9 02 69 00 8D C9 02 4C 42
11B1:36 81 20 3E 88 AD C2 02 B9
11B9:C9 01 F0 36 C9 02 F0 64 1F
11C1:AD CB 02 C9 00 F0 03 4C A0
11C9:51 89 AD CA 02 C9 01 B0 43
11D1:0D A9 03 8D CB 02 A9 E7 BF
11D9:8D CA 02 4C 36 81 38 AD 50
11E1:CA 02 E9 01 8D CA 02 AD 80
11E9:CB 02 E9 00 8D CB 02 4C 9B
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11F9:03 4C 83 89 AD C6 02 C9 10
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1211:38 AD C6 02 E9 01 8D C6 EA
1219:02 AD C7 02 E9 00 8D C7 F4
1221:02 4C 36 81 AD C9 02 C9 9A
1229:00 F0 03 4C B5 89 AD C8 A6
1231:02 C9 01 B0 0D A9 03 8D 96
1239:C9 02 A9 E7 8D C8 02 4C 56
1241:36 81 38 AD C8 02 E9 01 E5
1249:8D C8 02 AD C9 02 E9 00 AB
1251:8D C9 02 4C 36 81 20 3E E9
1259:88 4C D5 89 20 3E 88 4C 7F
1261:E6 89 B1 FB C9 01 90 08 CC
1269:38 E9 01 91 FB 8D B7 02 E4
1271:4C 36 81 B1 FB C9 16 F0 B8
1279:F7 18 69 01 91 FB 8D B7 2C
1281:02 4C 36 81 AD C2 02 C9 DE
1289:01 F0 1B C9 02 F0 2E AD 48
1291:C1 02 C9 01 F0 08 A9 01 5C
1299:8D C1 02 4C 36 81 A9 00 05
12A1:8D C1 02 4C 36 81 AD BF D4
12A9:02 C9 01 F0 08 A9 01 8D E6
12B1:BF 02 4C 36 81 A9 00 8D 63
12B9:BF 02 4C 36 81 AD C0 02 71
12C1:C9 01 F0 08 A9 01 8D C0 D6
12C9:02 4C 36 81 A9 00 8D C0 0A
12D1:02 4C 36 81 AD C2 02 C9 2F
12D9:01 F0 1C C9 02 F0 30 18 27
12E1:AD C5 02 69 01 8D C5 02 F0
12E9:C9 08 F0 03 4C 36 81 A9 2B
12F1:01 8D C5 02 4C 36 81 18 29
12F9:AD C3 02 69 01 8D C3 02 84
1301:C9 08 F0 03 4C 36 81 A9 44
1309:01 8D C3 02 4C 36 81 18 02
1311:AD C4 02 69 01 8D C4 02 DF
1319:C9 08 F0 03 4C 36 81 A9 5C
1321:01 8D C4 02 4C 36 81 18 3A
1329:AD C2 02 69 01 8D C2 02 73
1331:C9 04 F0 03 4C 36 81 A9 73
1339:01 8D C2 02 4C 36 81 AD A7
1341:C2 02 C9 01 F0 18 C9 02 10
1349:F0 28 18 AD B1 02 6D CC 0D
1351:02 85 FB AD B2 02 6D CD 7A
1359:02 85 FC 4C F6 8A 18 AD 06
1361:A9 02 6D CC 02 85 FB AD 23
1369:AA 02 6D CD 02 85 FC 4C 5C
1371:F6 8A 18 AD AD 02 6D CC B0
1379:02 85 FB AD AE 02 6D CD 82
1381:02 85 FC A0 00 B1 FB C9 3C
1389:00 F0 08 38 B1 FB E9 01 C2
1391:4C 61 8B A9 0F 4C 61 8B 3A
1399:AD C2 02 C9 01 F0 18 C9 E9
13A1:02 F0 28 18 AD B1 02 6D 31
13A9:CC 02 85 FB AD B2 02 6D D0
13B1:CD 02 85 FC 4C 4F 8B 18 8E
13B9:AD A9 02 6D CC 02 85 FB AD
13C1:AD AA 02 6D CD 02 85 FC FE
13C9:4C 4F 8B 18 AD AD 02 6D 72
13D1:CC 02 85 FB AD AE 02 6D E8
13D9:CD 02 85 FC A0 00 B1 FB 4C
13E1:C9 0F F0 08 18 B1 FB 69 38
13E9:01 4C 61 8B A9 00 91 FB F4
13F1:8D B8 02 4C 36 81 18 AD A7
13F9:B5 02 6D CC 02 85 FB AD C1
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1409:AD B3 02 6D CC 02 85 FD 83
1411:AD B4 02 6D CD 02 85 FE D4
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1421:40 C9 02 F0 24 AD C1 02 88
1429:C9 01 D0 25 AD D9 02 C9 85
1431:01 B0 19 A0 00 A2 00 B9 77
1439:AB 95 95 30 E8 C8 C0 08 46
1441:F0 10 C0 0E D0 F1 4C 19 DE
1449:8C 4C F8 8B A9 01 8D F0 FF
1451:02 60 A2 10 4C B5 8B A2 DA
1459:10 4C F1 8B A2 10 4C 15 96
1461:8C AD BF 02 C9 01 D0 E9 31
1469:AD D7 02 C9 01 B0 DD A0 62
1471:00 A2 00 B9 B9 95 95 30 5D
1479:E8 C8 C0 08 F0 D9 C0 0E 5F
1481:D0 F1 4C 19 8C AD C0 02 48
1489:C9 01 D0 C5 AD D8 02 C9 EB
1491:01 B0 B9 A0 00 A2 00 B9 EB
1499:C7 95 95 30 E8 C8 C0 08 B4
14A1:F0 BA C0 0E D0 F1 A0 00 79
14A9:B1 FD AA BD CA 94 A8 B1 07
14B1:30 C9 01 F0 28 B1 32 C9 C9
14B9:01 F0 31 A0 00 BD 40 94 DA
14C1:91 34 BD 57 94 91 36 B1 F5
14C9:FB AA C9 09 B0 2D BD 36 50
14D1:93 A0 00 91 40 18 B1 42 0D
14D9:69 01 91 44 60 A0 00 BD B0
14E1:6E 94 91 34 BD 85 94 91 9A
14E9:36 4C 3A 8C A0 00 BD 9C 6D
14F1:94 91 34 BD B3 94 91 36 74
14F9:4C 3A 8C 8A 48 A9 00 91 8B
1501:34 91 36 B1 FB C9 0E F0 9F
1509:09 C9 0F F0 24 68 AA 4C 7F
1511:41 8C B1 FD AA BD CA 94 8B
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1549:8C A9 00 91 32 4C 80 8C 8D
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1559:02 8D DB 02 AD B5 02 8D 59
1561:DE 02 AD B6 02 8D DF 02 A4
1569:AD C2 02 8D E0 02 AD CC 6B
1571:02 8D E1 02 AD CD 02 8D 92
1579:E2 02 20 20 8F A9 00 A0 5F
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1599:8E 4C 25 8D AD E4 02 CD 6E
15A1:C7 02 F0 06 20 29 8E 4C BD
15A9:25 8D A9 01 8D E9 02 4C 73
15B1:3D 8D AD F0 02 C9 01 F0 CC
15B9:11 18 AD E3 02 69 01 8D AB
15C1:E3 02 AD E4 02 69 00 8D A5
15C9:E4 02 A9 00 8D F0 02 AD FD
15D1:E5 02 CD C8 02 F0 06 20 B5
15D9:65 8E 4C 66 8D AD E6 02 3D
15E1:CD C9 02 F0 06 20 65 8E BE
15E9:4C 66 8D A9 01 8D EA 02 36
15F1:4C 7E 8D AD F0 02 C9 01 92
15F9:F0 11 18 AD E5 02 69 01 C9
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1609:8D E6 02 A9 00 8D F0 02 AA
1611:AD E7 02 CD CA 02 F0 06 71
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1621:02 CD CB 02 F0 06 20 A1 DC
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1641:01 8D E7 02 AD E8 02 69 EC
1649:00 8D E8 02 AD E9 02 C9 F8
1651:01 F0 0A 20 F2 8D C9 0D EB
1659:F0 2F 4C FC 8C AD EA 02 16
1661:C9 01 F0 0A 20 F2 8D C9 23
1669:0D F0 1E 4C 3D 8D AD EB 48
1671:02 C9 01 F0 14 20 F2 8D D4
1679:C9 0D F0 0D 4C 7E 8D A5 D9
1681:CB C9 3C F0 01 60 A9 0D 86
1689:60 AD DA 02 8D B3 02 AD B9
1691:DB 02 8D B4 02 AD DC 02 AB
1699:8D B5 02 AD DF 02 8D B6 ED
16A1:02 AD E0 02 8D C2 02 AD 9F
16A9:E1 02 8D CC 02 AD E2 02 54
16B1:8D CD 02 4C 36 81 AD A7 D7
16B9:02 8D B3 02 AD A8 02 8D 82
16C1:B4 02 AD A9 02 8D B5 02 CC
16C9:AD AA 02 8D B6 02 A9 01 A2
16D1:8D C2 02 AD E3 02 8D CC 9F
16D9:02 AD E4 02 8D CD 02 AD 84
16E1:BF 02 C9 01 D0 47 A9 01 AF
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16F1:8B 60 AD AB 02 8D B3 02 1C
16F9:AD AC 02 8D B4 02 AD AD F7
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1739:B4 02 AD B1 02 8D B5 02 C6
1741:AD B2 02 8D B6 02 A9 03 20
1749:8D C2 02 AD E7 02 8D CC 39
1751:02 AD E8 02 8D CD 02 AD 7E
1759:C1 02 C9 01 D0 CF A9 01 4C
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1769:8B 60 A0 00 A9 00 85 FB DD
1771:A9 20 85 FC A9 EA 85 FD FE
1779:A9 95 85 FE B1 FD 91 FB 27
1781:18 A5 FB 69 01 85 FB A5 F6
1789:FC 69 00 85 FC 18 A5 FD 7A
1791:69 01 85 FD A5 FE 69 00 41
1799:85 FE A5 FB C9 00 F0 03 F1
17A1:4C EF 8E A5 FC C9 24 F0 66
17A9:03 4C EF 8E 60 A0 00 A9 82
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17D9:A9 00 85 D3 4C 6C E5 A9 54
17E1:13 85 D6 A9 00 85 D3 20 4E
17E9:6C E5 4C FA 86 20 E4 FF 7F
17F1:A0 00 A9 3E 20 D2 FF A9 7F
17F9:9A 20 D2 FF A9 00 8D 34 74
1801:03 20 E4 FF C9 00 F0 F9 81
1809:C9 14 F0 40 C9 7B B0 F1 D4
1811:C9 11 F0 ED C9 13 F0 E9 CD
1819:C9 1D F0 E5 C9 22 F0 E1 8C
1821:C9 2C F0 DD C9 0D F0 10 B1
1829:AC 34 03 C0 14 F0 D2 20 53
1831:D2 FF 20 B5 8F 4C 74 8F 50
1839:AC 34 03 C0 00 F0 C2 4C CE
1841:D2 FF AC 34 03 99 35 03 9F
1849:EE 34 03 60 AC 34 03 C0 61
1851:01 B0 03 4C 74 8F 20 D2 48
1859:FF 38 AD 34 03 E9 01 8D DF
1861:34 03 4C 74 8F 4C 20 93 BE
1869:AD 7E 03 C9 01 F0 09 C9 B4
1871:02 F0 14 C9 03 F0 4F 60 D8
1879:A9 00 8D F6 02 AD 7F 03 68
1881:38 E9 30 8D F5 02 60 AD 4D
1889:7F 03 38 E9 30 A8 A9 00 57
1891:8D F6 02 8D F5 02 C0 00 98
1899:F0 16 18 AD F5 02 69 0A 3A
18A1:8D F5 02 AD F6 02 69 00 C3
18A9:8D F6 02 88 C0 00 D0 EA B9
18B1:AD 80 03 38 E9 30 18 6D 6A
18B9:F5 02 8D F5 02 AD F6 02 2D
18C1:69 00 8D F6 02 60 AD 7F 34
18C9:03 38 E9 30 A8 A9 00 8D 43
18D1:F5 02 8D F6 02 C0 00 F0 A2
18D9:16 18 AD F5 02 69 64 8D 3C
18E1:F5 02 AD F6 02 69 00 8D F5
18E9:F6 02 88 C0 00 D0 EA AD F9
18F1:80 03 38 E9 30 A8 C0 00 6E
18F9:F0 16 18 AD F5 02 69 0A 9A
1901:8D F5 02 AD F6 02 69 00 25
1909:8D F6 02 88 C0 00 D0 EA 1B
1911:AD 81 03 38 E9 30 18 6D 0C
1919:F5 02 8D F5 02 A9 00 6D FB
1921:F6 02 8D F6 02 60 AD 34 91
1929:03 C9 0C 90 13 C9 13 B0 70
1931:0F AD 36 03 C9 31 F0 09 4B
1939:C9 32 F0 20 C9 33 F0 37 31
1941:60 AD A7 02 8D 76 03 AD 1E
1949:A8 02 8D 77 03 AD A9 02 9D
1951:8D 78 03 AD AA 02 8D 79 95
1959:03 4C 02 91 AD AB 02 8D 27
1961:76 03 AD AC 02 8D 77 03 48
1969:AD AD 02 8D 78 03 AD AE D0
1971:02 8D 79 03 4C 02 91 AD A2
1979:AF 02 8D 76 03 AD B0 02 4F
1981:8D 77 03 AD B1 02 8D 78 BC
1989:03 AD B2 02 8D 79 03 AD 25
1991:35 03 C9 56 D0 AA AD 37 81
1999:03 C9 3A D0 A3 A0 00 B9 6D
19A1:35 03 C9 3A F0 09 C8 CC 16
19A9:34 03 F0 94 4C 12 91 C8 B4
19B1:A2 00 B9 35 03 C9 2D F0 4A
19B9:0E 9D 7F 03 E8 C8 CC 34 B2
19C1:03 F0 03 4C 25 91 60 8E 95
19C9:7E 03 C8 A2 00 B9 35 03 93
19D1:C9 54 F0 0D 9D 84 03 E8 DA
19D9:C8 CC 34 03 F0 E8 4C 40 5E
```

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19E1:91 8E 86 FF A2 A2 A2 A2 D8
19E9:A3 FF FF 73 FF FF 3A 32 CB
19F1:FF FF A2 AB FF FF FF FF 33
19F9:FF FF 26 FF 22 FF FF FF 02
1A01:FF FF 22 FF FF 0F 71 73 0C
1A09:FF FF B2 FF AF FF A3 73 CB
1A11:FF FF B3 C4 F8 FF FF 40 10
1A19:F0 88 FF 44 F0 4E 91 17 27
1A21:0D 08 FF FF 05 17 FF 08 6A
1A29:FF FF 05 17 FF 08 FF DF 6F
1A31:05 17 18 08 FF FF 0C 97 E0
1A39:91 FF 17 1C 08 FF FF 05 20
1A41:17 8F 08 FF FF 05 17 1F 47
1A49:08 FF DF 05 17 19 08 FF FA
1A51:FF 0C 97 91 FF 17 0F 08 17
1A59:FF FF 05 17 C8 08 FF FF 06
1A61:05 17 CC 08 FF DF 05 17 98
1A69:48 08 FF FF 04 81 FF FF E9
1A71:FF 16 F1 18 FF 16 E9 04 1B
1A79:B6 FD 08 FF 75 16 ED 04 6D
1A81:B6 69 08 FF FF FF 16 FF 98
1A89:04 B6 FD 08 FF 77 16 FF B7
1A91:04 B6 69 08 FF 7B 88 81 A3
1A99:FF FF 05 FF EF 0C FF FF 1E
1AA1:FF 05 F0 F9 9F 55 FF 91 B8
1AA9:1F FF 0C FF FF 04 81 FF 02
1AB1:FF FF 16 F0 68 FF 16 E9 11
1AB9:04 B6 FD 08 FF C1 16 ED FE
1AC1:04 B6 69 08 FF CC FF 16 9C
1AC9:FF 04 B6 FD 08 FF 41 16 8E
1AD1:FF 04 B6 69 08 FF 45 80 BF
1AD9:00 B9 89 03 99 7F 03 C8 77
1AE1:CC 88 03 D0 F4 AD 88 03 7E
1AE9:8D 7E 03 20 D8 8F C9 0D 8C
1AF1:F0 4F 18 AD 7A 03 6D F5 01
1AF9:02 85 34 AD 7B 03 6D F6 AB
1B01:02 85 35 18 AD 7C 03 6D 94
1B09:F5 02 85 36 AD 7D 03 6D A5
1B11:F6 02 85 37 18 AD 7A 03 D6
1B19:69 E7 8D 7A 03 AD 7B 03 20
1B21:69 03 8D 7B 03 18 A5 30 2A
1B29:69 01 85 30 A5 31 69 00 CC
1B31:85 31 A5 FC C5 31 B0 03 52
1B39:4C BB 92 A5 FC C5 31 F0 83
1B41:01 60 A5 FB C5 30 B0 F9 CE
1B49:A0 00 B1 FB 91 34 B1 FD 84
1B51:91 36 18 A5 FB 69 01 85 48
1B59:FB A5 FC 69 00 85 FC 18 55
1B61:A5 FD 69 01 85 FD A5 FE 95
1B69:69 00 85 FE 18 A5 34 69 1E
1B71:01 85 34 A5 35 69 00 85 3F
1B79:35 18 A5 36 69 01 85 36 F8
1B81:A5 37 69 00 85 37 A5 FC D6
1B89:C5 31 F0 0A A5 34 CD 7A C1
1B91:03 F0 0C 4C BD 92 A5 FB 4B
1B99:C5 30 F0 0D 4C FF 92 A5 DA
1BA1:35 CD 7B 03 F0 03 4C 06 B7
1BA9:93 60 A9 0D 60 A0 00 B9 07
1BB1:7F 03 C9 30 90 F4 C9 3A CA
1BB9:B0 F0 C8 CC 7E 03 D0 EF FB
1BC1:4C DB 8F 08 10 18 20 30 D8
1BC9:40 61 80 04 80 40 20 10 1E
1BD1:08 00 00 00 00 00 00 00 0C
1BD9:00 00 00 00 80 C0 E0 F0 C9
1BE1:F8 FC FE FF 0F 0D 0B 09 7F
1BE9:07 05 03 01 46 4A 4E 52 9F
1BF1:56 5A 5E 62 66 6A 6E 72 08
1BF9:76 7A 7E 82 86 8A 8E 92 10
1C01:96 9A 9E 11 1E 20 20 20 E1
1C09:20 20 20 20 20 20 20 20 41
```

```
1C11:20 54 48 45 20 53 4F 4E 07
1C19:47 20 4D 41 43 48 49 4E D6
1C21:45 96 56 4F 49 43 45 20 63
1C29:48 41 52 50 53 49 43 48 B3
1C31:4F 52 44 2A 20 46 4C 55 D8
1C39:54 45 2A 20 50 49 41 4E AC
1C41:4F 2A 20 58 59 4C 4F 50 20
1C49:48 4F 4E 45 2A 20 41 43 2F
1C51:43 4F 52 44 49 41 4E 2A A3
1C59:20 54 52 55 4D 50 45 54 E0
1C61:2A 20 53 54 45 45 4C 20 5E
1C69:47 55 49 54 41 52 2A 20 D0
1C71:4F 4E 45 9A 20 54 57 4F 87
1C79:9A 20 54 48 52 45 45 9A E2
1C81:1C 20 4F 4E 1C 20 4F 46 E4
1C89:46 70 6B 6B 6B 6D 20 70 E6
1C91:6B 6B 6B 6D 20 20 6E 73 70
1C99:73 73 7D 20 6E 73 73 73 B5
1CA1:7D 20 20 E1 00 41 09 00 D9
1CA9:40 00 00 11 60 00 10 00 36
1CB1:00 21 09 00 20 00 00 11 65
1CB9:00 F0 10 00 00 11 66 00 41
1CC1:10 00 00 21 60 00 20 E1 39
1CC9:00 51 5A 09 50 32 2C 2A FF
1CD1:25 21 1F 1C 19 16 15 12 E7
1CD9:10 0F 0E 0C 0B 0A 09 08 FA
1CE1:07 07 06 05 3C C1 3E A2 78
1CE9:87 A5 30 1E 60 1F D1 C3 1E
1CF1:D2 18 8F 30 8F 68 61 E9 59
1CF9:0C 47 98 35 2F 2A 27 23 04
1D01:1F 1D 1A 17 15 13 11 0F EC
1D09:0E 0D 0B 0A 09 08 07 07 0D
1D11:06 05 39 6B 3E DF 86 A5 91
1D19:DF 9C B5 1F EF C3 D2 EF 37
1D21:4E DA 8F F7 E1 E9 77 A7 F7
1D29:ED 2F 2C 27 23 21 1D 1A 10
1D31:17 16 13 11 10 0E 0D 0B CD
1D39:0B 09 08 08 07 06 05 05 1C
1D41:6B C1 DF 86 87 DF 9C B5 B0
1D49:60 EF C3 C3 EF 4E DA 30 03
1D51:F7 E1 61 77 A7 ED 98 06 CF
1D59:05 04 03 02 01 00 06 05 B0
1D61:04 03 02 01 00 06 05 04 D4
1D69:03 02 01 00 06 05 4C 4F F1
1D71:41 44 20 3F 53 41 56 45 E6
1D79:20 3F 43 4F 50 59 52 49 C6
1D81:47 48 54 20 31 39 39 31 10
1D89:20 43 4F 4D 50 55 54 45 29
1D91:0D 50 55 42 4C 49 43 41 84
1D99:54 49 4F 4E 53 20 49 4E 1B
1DA1:54 4C 20 4C 54 44 0D 41 F0
1DA9:4C 4C 20 52 49 47 48 54 92
1DB1:53 20 52 45 53 45 52 56 E6
1DB9:45 44 00 00 00 00 3C 66 86
1DC1:60 6E 66 66 3C 00 7E 60 3A
1DC9:60 78 60 60 7E 00 3C 66 37
1DD1:60 60 60 66 3C 00 18 3C 15
1DD9:66 7E 66 66 66 00 7E 60 AA
1DE1:60 78 60 60 60 00 78 6C DC
1DE9:66 66 66 6C 78 00 7C 66 A7
1DF1:66 7C 66 66 7C 00 3C 66 74
1DF9:60 6E 60 60 60 00 00 00 15
1E01:00 00 20 06 04 02 07 05 DC
1E09:03 01 06 04 02 07 20 50 C4
1E11:51 52 53 54 55 56 57 51 3E
1E19:52 53 54 58 01 00 0A 00 7F
1E21:64 00 E8 03 10 27 B0 80 DB
1E29:50 36 3E 46 80 50 20 3E 0B
1E31:46 4E C6 C8 CA 02 02 02 ED
1E39:5A 03 6F 03 0F D4 0E D4 3E
```

```
1E41:D9 02 D6 02 12 D4 4C 03 65
1E49:61 03 01 D4 00 D4 D7 02 69
1E51:D4 02 04 D4 53 03 68 03 C0
1E59:08 D4 07 D4 D8 02 D5 02 79
1E61:0B D4 37 55 73 91 AF CD A3
1E69:EB 0A 80 B0 36 98 3A 80 42
1E71:3E 68 42 50 46 38 4A 00 DB
1E79:00 00 00 00 00 00 00 00 B5
1E81:00 00 00 00 00 B0 00 00 80
1E89:80 00 00 B0 00 00 80 00 12
1E91:00 80 00 00 80 00 1E 80 AE
1E99:00 3F 80 00 3F 80 00 1E CF
1EA1:00 00 00 00 00 00 00 00 DD
1EA9:00 00 00 00 00 00 00 00 E5
1EB1:00 00 00 00 00 00 00 00 ED
1EB9:00 00 00 00 00 00 00 00 F5
1EC1:00 00 00 00 00 B0 00 00 C0
1EC9:80 00 00 80 00 00 80 00 4F
1ED1:00 80 00 00 80 00 1E 80 EE
1ED9:00 3F 80 00 3F 80 00 1E 10
1EE1:00 00 00 00 00 00 00 00 1E
1EE9:00 00 00 00 00 00 00 00 26
1EF1:00 00 00 00 00 00 00 00 2E
1EF9:00 00 00 00 00 00 00 00 36
1F01:00 00 00 00 00 B0 00 00 02
1F09:80 00 00 80 00 00 80 00 90
1F11:00 80 00 00 80 00 1E 80 30
1F19:00 3F 80 00 3F 80 00 1E 51
1F21:30 00 00 00 00 00 00 00 77
1F29:00 00 00 00 00 00 00 00 67
1F31:00 00 00 00 00 00 00 00 6F
1F39:00 00 00 00 00 00 00 00 77
1F41:00 00 00 00 00 80 00 00 81
1F49:80 00 00 80 00 00 80 00 D0
1F51:00 80 00 00 80 00 1E 80 70
1F59:00 3F 80 00 3F 80 00 1E 91
1F61:00 00 00 00 00 00 00 00 9F
1F69:00 00 00 00 00 00 00 00 A7
1F71:00 00 00 00 00 00 00 00 AF
1F79:00 00 00 00 00 00 00 00 B7
1F81:00 00 00 00 00 80 00 00 C1
1F89:80 00 00 80 00 00 80 00 11
1F91:00 80 00 00 80 00 1E 80 B0
1F99:00 3F 80 00 3F B0 00 1E 92
1FA1:30 00 00 00 00 00 00 00 F7
1FA9:00 00 00 00 00 00 00 00 E7
1FB1:00 00 00 00 00 00 00 00 EF
1FB9:00 00 00 00 00 00 00 00 F7
1FC1:00 00 00 00 00 80 00 00 02
1FC9:80 00 00 80 00 00 80 00 51
1FD1:00 80 00 00 80 00 1E 80 F0
1FD9:00 21 80 00 21 80 00 1E 99
1FE1:00 00 00 00 00 00 00 00 20
1FE9:00 00 00 00 00 00 00 00 28
1FF1:00 00 00 00 00 00 00 00 30
1FF9:00 00 00 00 00 00 00 00 38
2001:00 00 00 00 00 80 00 00 43
2009:80 00 00 80 00 00 80 00 92
2011:00 80 00 00 80 00 1E 80 32
2019:00 21 80 00 21 B0 00 1E 9B
2021:30 00 00 00 00 00 00 00 79
2029:00 00 00 00 00 00 00 00 69
2031:00 00 00 00 00 00 00 00 71
2039:00 00 00 00 00 00 00 00 79
2041:00 00 00 00 00 00 00 00 81
2049:00 00 00 00 00 00 00 00 89
2051:00 00 00 00 00 00 1E 00 CD
2059:00 21 00 00 21 00 00 1E 09
2061:00 00 00 00 00 00 00 00 A1
2069:00 00 00 00 00 00 00 00 A9
```

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2071:00 00 00 00 00 00 00 00 B1
2079:00 00 00 00 00 00 00 00 B9
2081:00 00 00 00 00 B0 00 00 84
2089:80 00 00 B0 00 00 80 00 16
2091:00 B0 00 00 80 00 1E 80 BE
2099:00 3F 80 00 3F 80 00 1E D3
20A1:00 00 00 00 00 00 00 00 E1
20A9:00 00 00 00 00 00 00 00 E9
20B1:00 00 00 00 00 00 00 00 F1
20B9:00 00 00 00 00 00 00 00 F9
20C1:00 00 00 00 00 00 00 00 02
20C9:00 00 00 00 00 00 00 00 0A
20D1:00 00 00 0F C0 00 0F C0 E7
20D9:00 00 00 00 00 00 00 00 1A
20E1:00 00 00 00 00 00 00 00 22
20E9:00 00 00 00 00 00 00 00 2A
20F1:00 00 00 00 00 00 00 00 32
20F9:00 00 00 00 00 00 00 00 3A
2101:00 00 00 00 00 00 00 00 43
2109:00 00 00 00 00 00 00 00 4B
2111:00 00 00 00 00 00 00 00 53
2119:00 00 00 00 00 00 00 0F 6A
2121:C0 00 0F C0 00 00 00 00 B1
2129:00 00 00 00 00 00 00 00 6B
2131:00 00 00 00 00 00 00 00 73
2139:00 00 00 00 00 00 0C 00 93
2141:00 06 00 00 03 00 00 01 1E
2149:80 00 07 C0 00 0F 00 00 F4
2151:0E 00 00 06 00 00 03 00 01
2159:00 01 80 00 06 00 00 0C 28
2161:00 00 0C 00 00 06 00 00 3D
2169:01 80 00 00 00 00 00 00 4C
2171:00 00 00 00 00 00 00 00 B3
2179:00 00 00 00 00 00 00 00 BB
2181:00 00 00 00 00 00 00 00 C3
2189:00 00 00 20 00 00 20 00 0E
2191:00 20 00 00 20 00 00 20 FC
2199:00 0C 20 00 1E 20 00 1E 72
21A1:A0 00 0C 20 00 00 00 00 B7
21A9:00 00 00 00 00 00 00 00 EB
21B1:00 00 00 00 00 00 00 00 F3
21B9:00 00 00 00 00 00 00 00 FB
21C1:00 00 00 00 00 00 00 00 04
21C9:20 00 0C 20 00 1E 20 00 58
21D1:1E A0 00 0C 20 00 00 20 2D
21D9:00 0C 20 00 1E 20 00 1E B2
21E1:A0 00 0C 20 00 00 00 00 F7
21E9:00 00 00 00 00 00 00 00 2C
21F1:00 00 00 00 00 00 00 00 34
21F9:00 00 00 00 00 00 00 00 3C
2201:00 00 00 00 00 00 00 00 45
2209:00 00 00 00 00 00 00 00 4D
2211:00 00 00 0C C0 00 1F E0 3B
2219:00 0C C0 00 0C C0 00 1F FA
2221:E0 00 0C C0 00 00 00 00 63
2229:00 00 00 00 00 00 00 00 6D
2231:00 00 00 00 00 00 FF 00 75
2239:00 00 00 00 00 00 00 00 7D
2241:00 00 00 00 00 00 00 00 85
2249:00 00 02 00 00 02 00 00 D5
2251:02 00 00 02 C0 00 02 60 21
2259:00 02 60 00 02 C0 00 03 40
2261:80 00 03 00 00 02 00 00 4E
2269:00 00 00 00 00 00 00 00 AD
2271:00 00 00 00 00 00 00 00 B5
```

Daniel Lightner, who lives in Montana, likes to fish and raise Himalayan cats when he's not programming. ❐

THE AUTOMATIC PROOFREADER

Philip I. Nelson

The Automatic Proofreader helps you type in program listings for the 128 and 64 and prevents nearly every kind of typing mistake.

Type in *Proofreader* exactly as listed. Because the program can't check itself, type carefully to avoid mistakes. Don't omit any lines, even if they contain unusual commands. After you've finished, save a copy before running it.

Next, type RUN and press Return. After the program displays the message *Proofreader Active,* you're ready to type in a BASIC program.

Every time you finish typing a line and press Return, *Proofreader* displays a two-letter checksum in the upper left corner of the screen. Compare this result with the two-letter checksum printed to the left of the line in the program listing. If the letters match, the line probably was typed correctly. If not, check for your mistake and correct the line.

Proofreader ignores spaces not enclosed in quotation marks, so you can omit or add spaces between keywords and still see a matching checksum. Spaces inside quotes are almost always significant, so the program pays attention to them.

Proofreader does not accept keyword abbreviations (for example, ? instead of PRINT). If you use abbreviations, you can still check the line by listing it, moving the cursor back to the line, and pressing Return.

If you're using *Proofreader* on the 128, do not perform any GRAPHIC commands while *Proofreader* is active. When you perform a command like GRAPHIC 1, the computer moves everything at the start of BASIC program space—including the *Proofreader*—to another memory area, causing *Proofreader* to crash. The same thing happens if you run any program with a GRAPHIC command while *Proofreader* is in memory.

Though *Proofreader* doesn't interfere with other BASIC operations, it's a good idea to disable it before running another program. To disable it, turn the computer off and then on. A gentler method is to SYS to the computer's built-in reset routine (65341 for the 128, 64738 for the 64).

```
AS 0 CLR
KK 10 VE=PEEK(772)+256*PEEK(77
      3):LO=43:HI=44:PRINT"
      {CLR}{WHT}AUTOMATIC PROO
      FREADER FOR ";
EB 20 IF VE=42364 THEN PRINT "
      64"
AA 30 IF VE=17165 THEN LO=45:H
      I=46:GRAPHIC CLR:PRINT"1
      28"
KK 40 SA=(PEEK(LO)+256*PEEK(HI
      ))+6:FOR J=SA TO SA+166:
      READ B:POKE J,B:CH=CH+B:
      NEXT
QF 50 IF CH<>20570 THEN PRINT
      {SPACE}"*ERROR* CHECK TY
      PING IN DATA STATEMENTS"
      :END
PD 60 FOR J=1 TO 5:READ RF,LF,
      HF:RS=SA+RF:HB=INT(RS/25
      6):LB=RS-(256*HB)
XB 70 CH=CH+RF+LF+HF:POKE SA+L
      F,LB:POKE SA+HF,HB:NEXT
SB 80 IF CH<>22054 THEN PRINT
      {SPACE}"*ERROR* RELOAD P
      ROGRAM AND CHECK FINAL L
      INE":END
PH 90 IF VE=17165 THEN POKE SA
      +14,22:POKE SA+18,23:POK
      ESA+29,224:POKESA+139,22
      4
JS 100 POKE SA+149,PEEK(772):P
       OKE SA+150,PEEK(773):PR
       INT"{CLR}PROOFREADER AC
       TIVE"
FA 110 SYS SA:POKE HI,PEEK(HI)
       +1:POKE (PEEK(LO)+256*P
       EEK(HI))-1,0:NEW
PS 120 DATA120,169,73,141,4,3,
       169,3,141,5,3,88,96,165
       ,20,133,167
PS 130 DATA165,21,133,168,169,
       0,141,0,255,162,31,181,
       199,157,227
XS 140 DATA3,202,16,248,169,19
       ,32,210,255,169,18,32,2
       10,255,160
JC 150 DATA0,132,180,132,176,1
       36,230,180,200,185,0,2,
       240,46,201
XJ 160 DATA34,208,8,72,165,176
       ,73,255,133,176,104,72,
       201,32,208
GM 170 DATA7,165,176,208,3,104
       ,208,226,104,166,180,24
       ,165,167
KH 180 DATA121,0,2,133,167,165
       ,168,105,0,133,168,202,
       208,239,240
RM 190 DATA202,165,167,69,168,
       72,41,15,168,185,211,3,
       32,210,255
BR 200 DATA104,74,74,74,74,168
       ,185,211,3,32,210,255,1
       62,31,189
RM 210 DATA227,3,149,199,202,1
       6,248,169,146,32,210,25
       5,76,86,137
HJ 220 DATA65,66,67,68,69,70,7
       1,72,74,75,77,80,81,82,
       83,88
XR 230 DATA 13,2,7,167,31,32,1
       51,116,117,151,128,129,
       167,136,137
```

ONLY ON DISK

In addition to the type-in programs found in each issue of the magazine, *Gazette Disk* offers bonus programs and original 64 and 128 artwork.

WorldMap 64/128
Bruce M. Bowden
Greensboro, NC

WorldMap 64 and *WorldMap 128* give you three different ways of looking at our planet. View it as seen in a Mercator projection, from any position above the equator, or from above either pole. You can save any of these high-resolution screens for use in paint programs or for creating your own slide shows.

Order this disk ($9.95 plus $2.00 shipping and handling) from Gazette Disk, COMPUTE Publications, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408. Save by calling (800) 727-6937 and ordering a year's subscription—12 disks and 12 magazines for only $39.95.

TYPING AIDS

MLX, our machine language entry program for the 64 and 128, and *The Automatic Proofreader* are utilities that help you type in Gazette programs without making mistakes. To make room for more programs, we no longer include these labor-saving utilities in every issue, but they can be found on each *Gazette Disk* and are printed in all issues of *Gazette* through June 1990.

If you don't have access to a back issue or to one of our disks, write to us, and we'll send you free copies of both of these handy programs. We'll also include instructions on how to type in Gazette programs. Please enclose a self-addressed, stamped envelope.

Write to Typing Aids, COMPUTE's Gazette, 324 West Wendover Avenue, Suite 200, Greensboro, North Carolina 27408.

Get a head start on Headline Harry's Great Paper Race, *take a look at the sequel to* Elvira, *and scrutinize an abundance of other evaluations.*

HEADLINE HARRY AND THE GREAT PAPER RACE

You have only three hours left before your deadline. Miss it and Marvin Muckraker's devious reporters will print their falsified stories on the front page of the *Diabolical Daily.* Not only will you have to face your angry editor, Headline Harry, but the public will never learn the true story. Such is the life of a reporter in *Headline Harry and the Great Paper Race,* a game that combines lessons in modern history, geography, and problem-solving.

Both older children and adults will enjoy sifting through the abundant facts when they join Headline Harry's crusade to stop the presses of the scheming competition. Choose the region of the United States that you most want to tackle and decide which historical event from that area warrants a lead story. File the story before your deadline arrives. To make matters more difficult, you might lose time traveling, discovering information, or falling prey to one of Marvin Muckraker's reporters.

The animated adventures include digitized speech and music, and are available in 16- or 256-color versions. Players can only explore 12 stories, but the upcoming teachers' edition will allow for three times that many. A convenient save-game feature allows you to save stories in progress.

Headline Harry doesn't promise that scooping the *Diabolical's* reporters will be easy; it takes perseverance. But students, especially, will find this fact-chasing mission a welcome break from clunky history books. Complex, but not frustrating, *Headline Harry* is good news for rookie reporters looking to build their problem-solving skills.

CHANTELLE OLIGSCHLAEGER

Scheduled for release: August 1991

IBM PC and compatibles, 512K RAM (640K for MCGA and VGA 256 color); CGA, EGA, MCGA, VGA, Tandy 16-color, and Hercules; requires hard drive; supports Ad Lib, Sound Blaster, PS/1 sound cards; supports mouse—$49.95 for 16-color version, $59.95 for 256-color version

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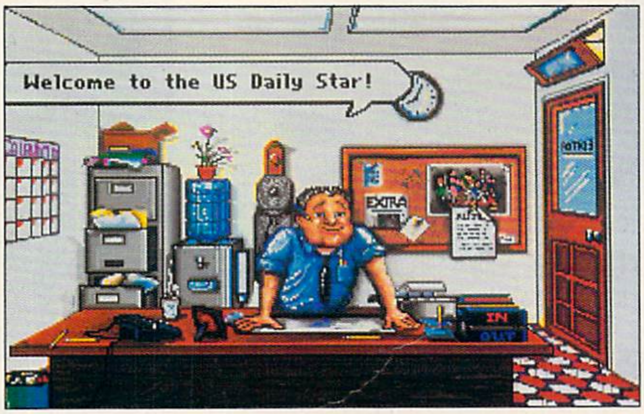
Circle Reader Service Number 312



Your interstate journey begins in Headline Harry's office where he assigns you a front-page story.

ELVIRA II: THE JAWS OF CERBERUS

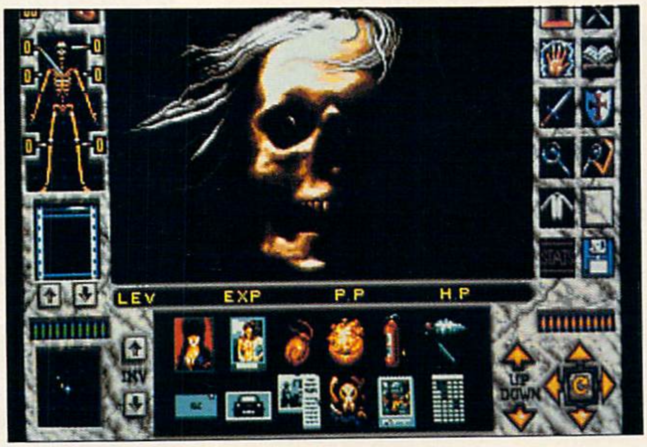
As a horror movie queen, Elvira seems to encounter more than her share of problems. In this impressive sequel to the first Elvira adventure game, the demonic, three-headed Cerberus kidnaps our favorite delicate creature and makes off with her to a darksome location. As always, your job entails saving the day using your wits, a full complement of spells, and persistence.

Somewhere in the studios of Black Widow Productions, on one of three sound stages, you'll find the kidnapped Elvira. Whether she's prisoner within the traditionally haunted Victorian house, the spider-infested catacombs, or the foreboding graveyard, as her rescuer you can expect to encounter chilling special effects and surprises, including some decomposing corpses. Accolade intended *Elvira II: The Jaws of Cerberus* to out-shock and outcreep every other adventure game on the market and they succeed. The detailed, macabre sets and horrific, animated monsters engender an atmosphere of perfectly delightful dread.

As in the first game, you'll find the controls necessary to explore Elvira's world on screen at all times. New and notable, however, is a clever health icon in the shape of a human body that clearly indicates your character's status, including number of hit points per body part. This indicator becomes skeletal as you take damage. Eerie!

Better than a horror double feature, *Elvira II: The Jaws of Cerberus* will test the mettle of experienced adventurers. And while Elvira herself might offer some moments of comic relief, this frightfest packs more gasps than laughs.

DAVID SEARS



Elvira II: The Jaws of Cerberus *will curdle your blood and raise your hackles with its strikingly morbid graphics.*

Scheduled for release: October 1991

IBM PC and compatibles, 512K RAM; CGA, EGA, VGA, or Hercules; supports Ad Lib, Game Blaster, Roland MT-32, and Sound Blaster; supports mouse and joystick—$59.95

Also available for Amiga—$59.95 and Atari ST—$59.95

ACCOLADE
550 S. Winchester Blvd.
San Jose, CA 95128
(408) 985-1700

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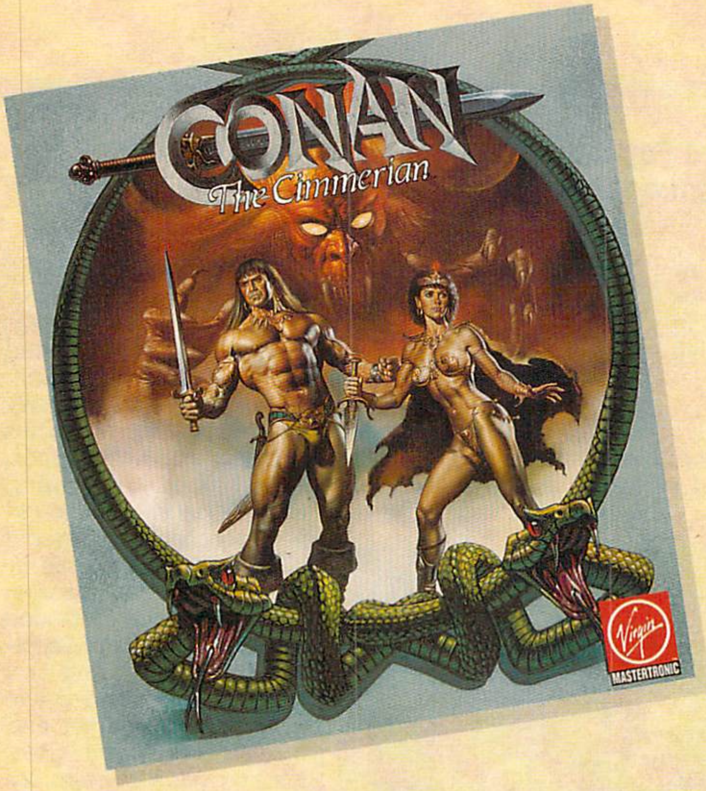

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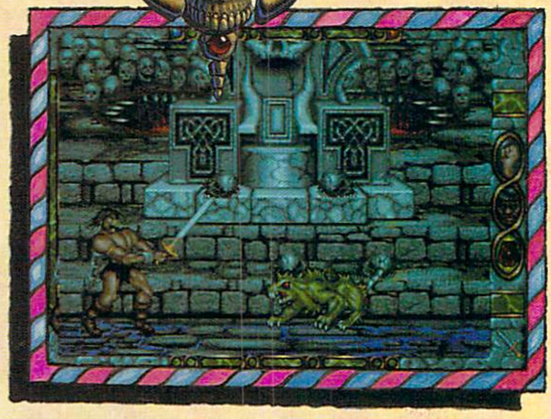


The greatest hero for the Hyborean Age was a fierce barbarian born of the harsh northlands,

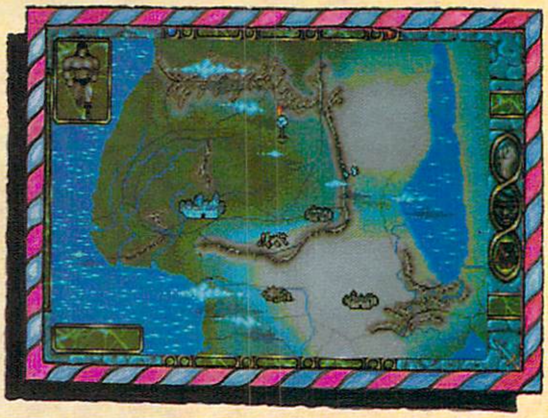
CONAN THE CIMMERIAN

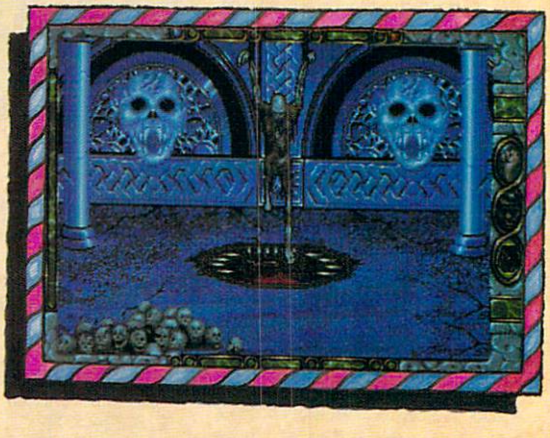
You have heard the tales of Conan's adventures. Only now will you have the opportunity to live the life of this fierce barbarian from the land of Hyborea.

Our odyssey begins with murder most foul. When Conan's village is massacred by the ravening hordes of Thoth Amon, high priest of the vile cult of Set, Conan vows to avenge the death of his family and friends.

In your search for vengeance, you as Conan, will explore Hyborea to seek out its hidden secrets and learn of its powers. Visit over 200 locations – taverns and inns, crypts and dungeons, temples and tombs, lavish homes and poor hovels – to learn the mysteries of Hyborea's sorceries to help Conan overcome its many natural and supernatural perils.

Only with luck, courage and constant struggle will Conan have the chance to force a reckoning with the powerful Thoth Amon.





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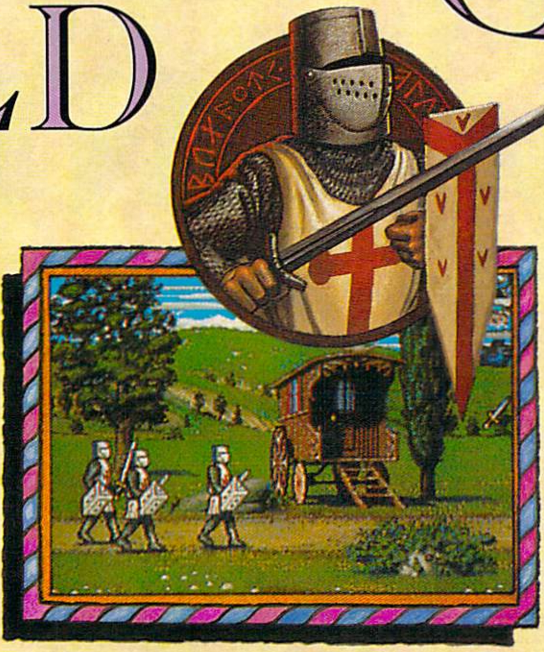
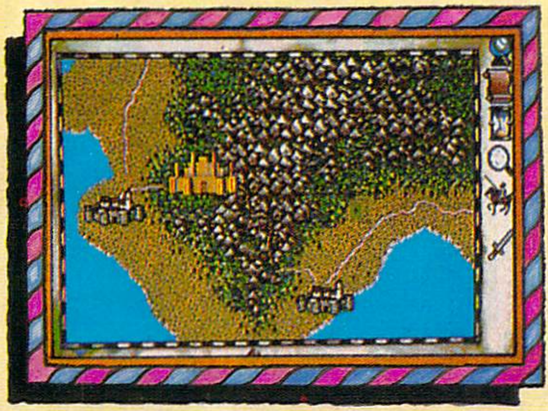
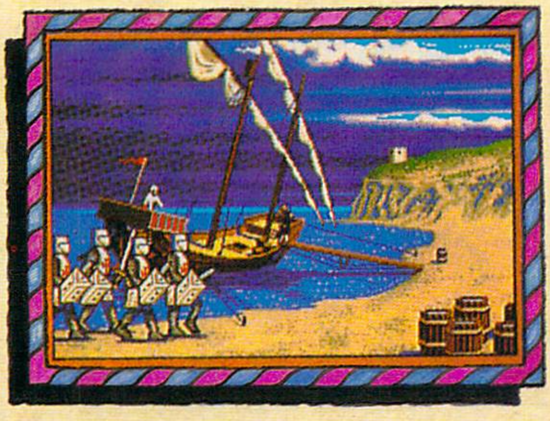
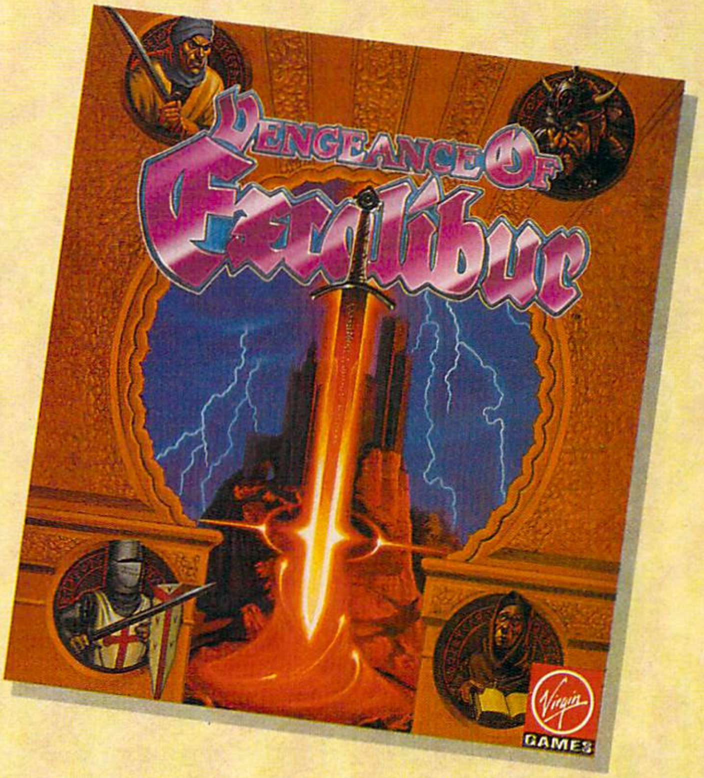
CHING LD









In Spirit of Excalibur, the Knights of the Round Table fought to defend medieval Britain from the evil sorceress, Morgan Le Fay. Morgan, dabbling in dark arts beyond even her ability to control, had summoned a great Lord of Demons, the Shadowmaster.

With Morgan's death, the Shadowmaster was freed to work his evil will against the unprepared folk of Britain. Striking in the night, he imprisoned the King with a spell, stole the greatest treasures of the realm and kidnapped Nineve, the court enchantress. With the loss of the sword Excalibur and the newly recovered Holy Grail, Britain begins to sicken and die. The Shadowmaster must be stopped!

Command knights and whatever followers they are able to recruit to track the Shadowmaster through hazardous, beautiful and mysterious medieval Spain. Explore the hundreds of villages and cities, fortresses and castles, dungeons and palaces and all the secret places where the Shadowmaster may dwell.

Seek what aid you can as you acquire and learn the use of the sorceries of Moorish Spain, for only with the aid of enchantments and the loyalty of strong allies will you stand a chance of ridding the world of the demonic Shadowmaster once and for all.

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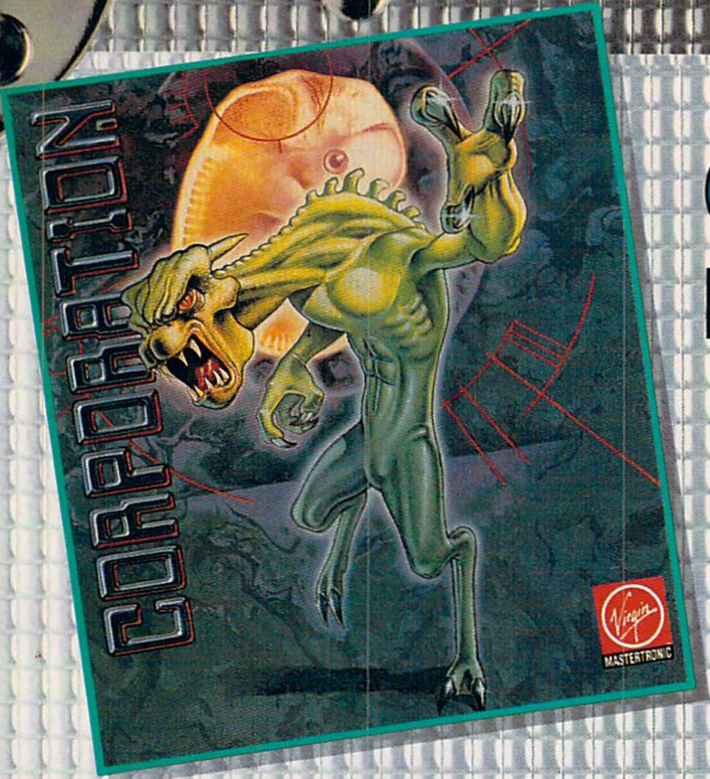
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ARE YOU TOUGH ENOUGH TO TAKE ON THE 21st CENTURY AND SAVE MANKIND FROM HIS UNTIMELY DESTRUCTION BY A GENETICALLY ENGINEERED WAR MACHINE?!?

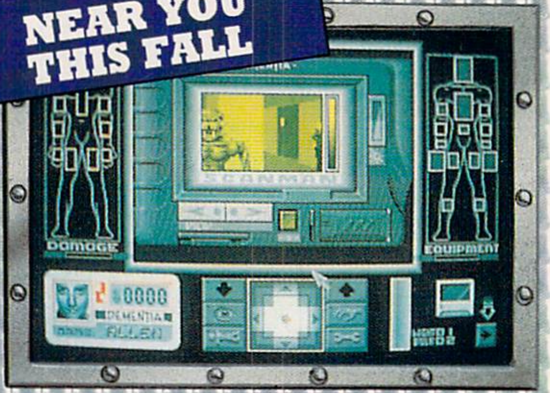
Talk about your work-related stress! As a ZODIAC special agent, your job is to crack the complex security systems of the Universal Cybernetics Corporation and track down the mutant robot they have designed as the ultimate killing machine.

You'll arm yourself with a whole arsenal of weapons – everything from hologram projectors to special vision enhancement visors to thermal infra-red image intensifiers. If all else fails – you'll have to rely on your own psychic powers!

FEATURES INCLUDE:

- 16-level 3-dimensional environment complete with fast, smooth scrolling
- Realistic action control of six characters: 2 male, 2 female and 2 droid
- 360 degree vision
- Environmental sound effects

"Tension and unease, with danger lurking around every corner.... This Number One European Hit will keep you on your toes and coming back for more."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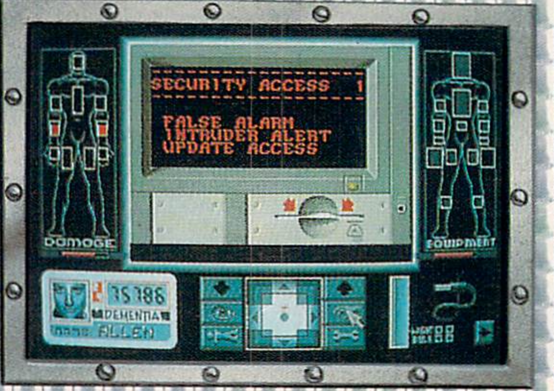

SECURITY ACCESS 1
FALSE ALARM
INTRUDER ALERT
UPDATE ACCESS

DAMAGE
EQUIPMENT
35786
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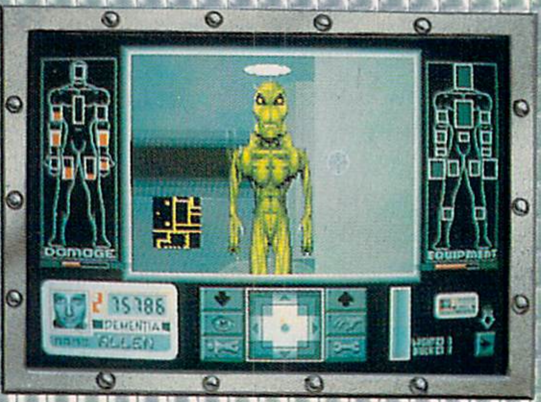
ALLEN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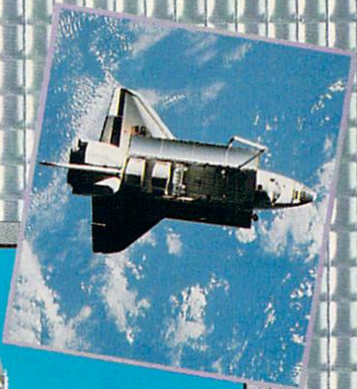

SHUTTLE
THE SPACE FLIGHT SIMULATOR
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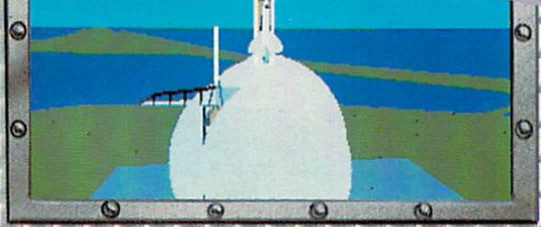

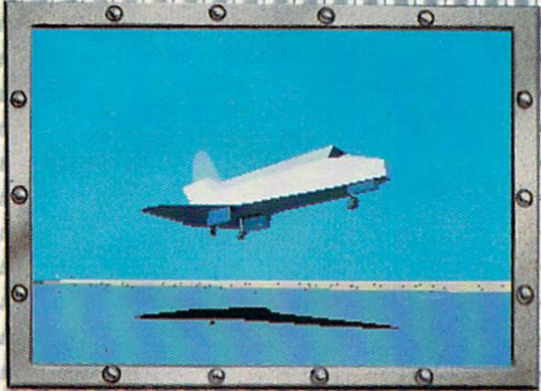

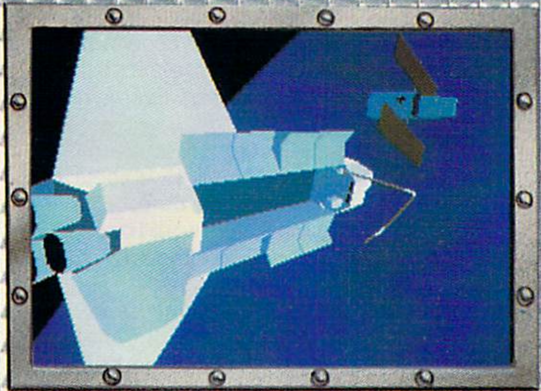

The space flight simulator to end all simulators, SHUTTLE is the most accurate and comprehensive simulation of NASA's Space Shuttle ever produced for the home computer.

With the aid of Mission Control, you will master such challenges as deploying and repairing satellites, launching spy satellites, maneuvering your craft in zero gravity, attaining the correct re-entry trajectory, and pulling off complicated landings.

Advanced polygon and elliptical graphics, along with actual land and star maps were used to create the breathtaking 3D panoramas of the Orbiter and its environment, which can be viewed from any angle at any time.

Other features include:

- Authentic control panel display
- Detailed comprehensive training and reference manual
- Numerous training, scientific and "Star Wars" (SDI) Missions
- Multiple help levels from "novice" to "veteran"
- Various launch and landing sites
- Orchestral quality music
- Fold-out Shuttle flight deck poster

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Circle Reader Service Number 179

PUBTECH FILE ORGANIZER

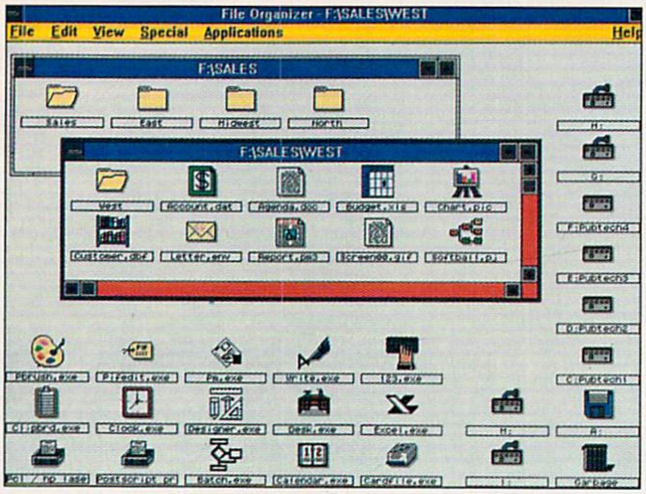
To judge from third-party developers' efforts, Microsoft really missed the mark with the Program Manager and File Manager in *Windows* 3.0. A dozen replacement file managers and shells (program launchers)—and a few products that do both—promise an improved *Windows* environment. One of the best of these, *PubTech File Organizer* 3.0, makes good on that promise.

File Organizer strives to simplify controlling the computer within *Windows*. As with many simplifications, it gets harder before it gets easier. If you have several hard disks and many files, for instance, the first screen you see after installing *File Organizer* is downright scary. The 320-meg hard drive on my Arche Legacy 386-33 is partitioned into ten drives with an assortment of installed printer drivers. The initial screen displays a double stack of drive icons along the right side and a row of printer driver icons across the bottom. A row of icons representing minimized applications runs above the printer icons. Of the 22 icons on the screen, none will run an actual program. Not even the *Windows* desktop accessories are available. To launch an application, click on the icon for the program's hard drive. That opens a window with a folder icon for each directory in the drive and icons for all the files in the root directory. If your desired executable file is in a subdirectory, click on its folder and find the appropriate file icon. Double-click, and you're running.

That's not easier than the *Windows* Program Manager. *File Organizer* provides three easier ways to launch a program: putting the program's icon on the desktop, assigning a special hot key to the program, or adding it to the pull-down applications menu. All work well.

If you put icons on the desktop, though, you'll fill your already-crowded desktop quickly. Instead, move to the Desktop Utilities function (which has its own separate manual) to create any number of custom desktops. For instance, you could have a desktop with *Excel* and its associated subprogram icons along with icons for your most frequently used spreadsheet files. Pull up your *Excel* desktop, and you're ready to work. Or if you have a regular task that involves several separate applications, create a desktop with those applications already running. Although creating the desktop files can take some time, you have an endlessly customizable front end for *Windows*.

File Organizer has features, however, that you can enjoy right out of the box, most notably icon-based file manipulation. To move an entire subdirectory from one drive or directory to another, grab its folder and drag it to where you want it. Dragging a file to the trash can icon deletes the file. To print a file, drag its icon onto the printer icon. To start an application and load a file, drag the file icon onto the application icon. Almost any file management task is done solely by clicking on and moving icons.



PubTech File Organizer *grants you superior control of* Windows *files through improved icon control.*

For file management by icon, *File Organizer* is top-notch. As a Program Manager replacement, it takes a shift of gears and extra time to set up an appropriate batch of customized desktops. If you persist, though, and thoughtfully customize, you'll have a *Windows* shell that suits you perfectly.

RICHARD O. MANN

IBM PC AT and compatibles (286, 386, or 486), 640K RAM, DOS 3.0 or *Windows* 3.0, hard disk; mouse recommended—$199.95

PUBLISHING TECHNOLOGIES
7719 Wood Hollow Dr., Ste. 260
Austin, TX 78731
(800) PUB-TECH (sales)
(512) 346-2835

Circle Reader Service Number 314

BUSHBUCK CHARMS, VIKING SHIPS, & DODO EGGS/ GEOJIGSAW

A scavenger hunt by any other name could never be this much fun. *BushBuck Charms, Viking Ships, & Dodo Eggs* (yes, that's the name) is superior educational software. Not only will you gain an understanding of the world's cultures and increase your knowledge of geography, but you'll have fun along the way.

The object of the game is to fly to the different countries of the world and gather various common objects in each country you visit. Each location offers a special attraction or contains some historical significance; their descriptions can help you later, so read them all carefully. Points accumulate as you discover objects. Colorful, detailed maps and creative, animated sequences add interest, while the musical scores tend to stick with you for hours after you play.

Play alone, against another player, or against one of the included villains: Pierre, Natasha, and Otto von Slinkenrat, a real stinker who slimed his way to the top of the PICKLE (Preserving Individual Cultures and Knowledge in Lands Everywhere) Foundation.

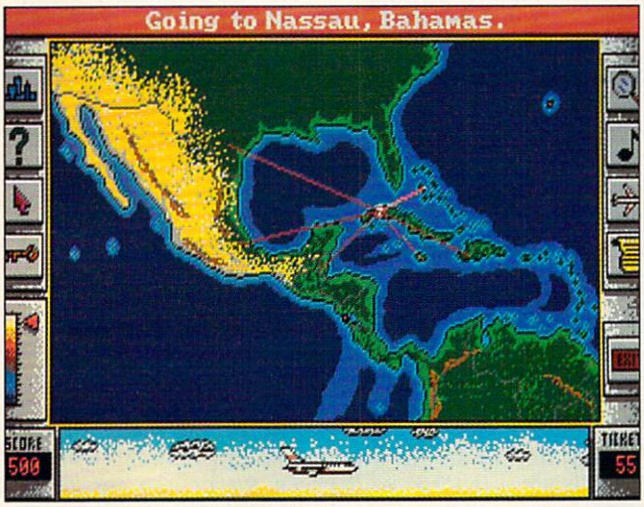
My complaints are minor. Gathering all 15 objects requires some time; a save-game feature would be appreciated. And although recommended for all ages, I wouldn't expect *BushBuck Charms* to hold the interest of very young children unless they're able to read and decipher maps. Children with those skills will love the game, if they can persuade Mom and Dad to quit playing for a while.

Another PC Globe educational game, *GeoJigsaw,* is far more suitable for young children. The color-cycling feature (available for VGA systems only) creates an illusion that the 12 puzzles are animated. Puzzle choices range from depictions of dinosaurs to the solar system. Additional puzzle disks would offer variety, but none were offered on the order blank included in the game box.

Puzzles may be cut into as few as 6 or as many as 294 puzzle pieces—just remember that you have to put the pieces back together. Puzzle pieces are easy to move with a mouse or joystick. A keyboard option is available, but maneuvering pieces using this option is difficult. The game supports only the PC speaker, but it does reward a completed puzzle with musical notes. A puzzle is automatically saved in its current state if you quit the game.

While *GeoJigsaw* not as strong a teaching tool as *BushBuck Charms,* both games offer children an opportunity to learn and enjoy themselves at the same time. And at a cost of $39.95 for *GeoJigsaw* and $49.95 for *BushBuck Charms,* learning comes at bargain prices.

JOYCE SIDES



Going to Nassau, Bahamas.

Scavenger hunts go global and show their educational side in BushBuck Charms, Viking Ships, & Dodo Eggs.

BushBuck Charms, Viking Ships, & Dodo Eggs

IBM PC and compatibles, 512K RAM, CGA, EGA, or VGA; mouse and Ad Lib sound card optional—$49.95

GeoJigsaw

IBM PC and compatibles, 512K RAM, CGA, EGA, MCGA, VGA, or Tandy 16-color; mouse optional—$39.95

PC GLOBE
4700 S. McClintock
Tempe, AZ 85282
(602) 730-9000

Circle Reader Service Number 315

PC DISKLOCK

Data security is increasingly becoming a top-priority issue for small business owners and corporate MIS managers alike. Now Fifth Generation Systems, maker of the *Mace Utilities,* offers a solution to this growing problem with *PC Disklock.*

Disklock provides comprehensive protection of sensitive data through the use of primary and secondary passwords, selective locking and encryption of files, and an audit trail of unsuccessful log-on attempts.

Disklock's password system draws the first line of defense. When installing the program, the user selects a primary password and, optionally, a secondary password. When using the primary password, the user has full access to all files and directories on the system, while someone logged on under the secondary password cannot access locked or encrypted files. This sort of simple security is useful in situations where several users, some of whom do not require access to sensitive files, share one computer.

In addition to the general security provided by the password system, *Disklock* provides two methods of safeguarding selected files. By locking a file, you make it inaccessible to users logged on under the secondary password. Encrypting a file, in addition to making it inaccessible to secondary users, also encodes the data in a way that makes it unintelligible. You can decrypt files only with the primary password you chose earlier.

As a final safety feature, *Disklock* keeps a log of all unsuccessful log-on attempts. *Disklock* stores the time and date of each failed entry attempt in a file called Disklock.log, which you may review periodically.

Does the average user need a data guardian such as *Disklock?* Probably not. Its main use will be to provide security in business environments where several users share computers containing sensitive information. Because of its thoughtful design, *PC Disklock* places a minimal burden on legitimate users while keeping the bad guys, and the merely curious, at bay.

RICHARD RAPP

IBM PC, and compatibles, 512K RAM, hard drive; mouse optional—$189

FIFTH GENERATION SYSTEMS
10049 N. Reiger Rd.
Baton Rouge, LA 70809-4559
(504) 291-7221

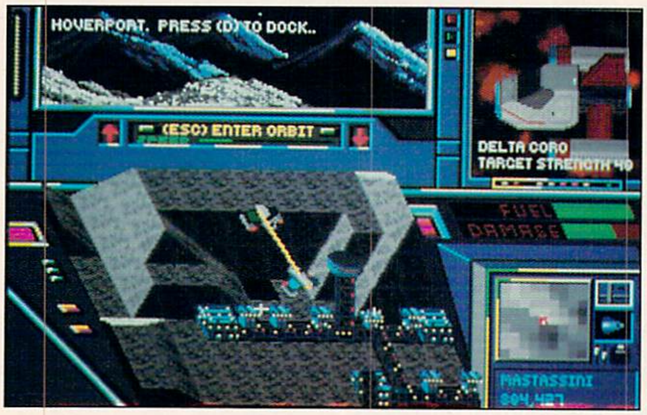
Circle Reader Service Number 316

HARD NOVA

Nova's not your typical twenty-first century housewife content to sit home tending the antigravity machine. Armed with a generous supply of Sonic Mace and a Stun Club, this spacegoing barracuda seeks a more fulfilling life of contract kidnapping, assassination, and smuggling assignments. Nova's a mercenary, and she stays alive by never dropping her guard or her weapons.

Hard Nova offers a combination of arcade action, role-playing, and strategy—providing a little something for everyone, including a choice of playing a male lead (Stark) instead of a female (Nova). First-rate graphics begin with the opening screens and culminate in a visual explosion as you traverse a stargate (providing you keep your Bremar-Nav sentient alive long enough to lead you through).

The graphics do more than just provide colorful eyewash, however; they serve to help orient you to your rapidly changing alien surroundings, reveal the whereabouts of your few friends and many enemies, and occasionally supply a way to rest your war-



From the command chair in Hard Nova, *you'll conduct serious, but diverting, mercenary action.*

weary brain by playing Zero-G Roulette.

The gee-whiz technology evidenced throughout *Hard Nova* extends beyond its top-quality graphics to encompass numerous ingenious ways to pillage, plunder, maim, and murder. In the four distant frontier worlds where you ply your trade, the power of your weapons contributes directly to the length of your life.

Hard Nova provides one of the deadliest and most diabolical assortments of personal or ship-based armament this side of, well, Ariel. Weapons alone, however, do not guarantee survival; you still need what on Earth would be called people skills. Most often when you encounter aliens or humans, you try to kill them (or they kill you).

Remaining alive and victorious requires that you collect useful, strategic, and current information. You do that by questioning foul-smelling bartenders, beautiful women, and spiritless aliens. You need not be polite—say (or do) whatever is needed to get your answers.

It's all in a day's work for a mercenary, and you'll fight anything, if the price is right. You've come a long way, baby. . . .

HOWARD MILLMAN

IBM PC and compatibles, 512K RAM, EGA, MCGA, or VGA; supports mouse, hard drive recommended, supports Roland MT-32, Ad Lib, and PS/1 sound boards—$49.95

ELECTRONIC ARTS
1820 Gateway Dr.
San Mateo, CA 94404
(800) 245-4525

Circle Reader Service Number 317

FASTBACK PLUS

Let's face it; most of us don't back up our hard drives as often as we should. We see it as a tedious, time-consuming, and generally unpleasant experience. But thanks to the award-winning *Fastback Plus,* this doesn't have to be true.

Fastback Plus includes a host of features, such as support for floppy, tape, and removable drives, as well as multiple hard drives. Advanced data compression, error detection, incremental and differential backups, and automatic disk formatting make backup chores less onerous and more rewarding. A macro facility allows you to automate your backups. The only major features missing from *Fastback Plus* are disk image backups and LAN support. The omission of disk image backups, used most often when saving data to a streaming tape drive, seems odd considering the wealth of options you're offered in other areas of the program.

Be that as it may, *Fastback Plus* offers the average user more than enough choices. The data compression option allows you to choose between minimizing either the number of disks used or the amount of time used to perform the compression. The macro facility is extensive enough for all but the most demanding backups, and you can even choose between the original command line interface or the new point-and-click one. This allows users of the original *Fastback* to upgrade to the new package without having to rewrite their existing macros and batch files.

You are buying a well-conceived package when you pick up *Fastback Plus.* The *Fastback Plus* manual offers advice on developing a regular backup regimen and explains the program's features in understandable terms. You can choose from a multitude of options and, most importantly, *Fastback Plus* is fast. So unless you need specialized features such as disk image backups or LAN support, *Fastback Plus* is the program to make hard drive failure a temporary condition at worst.

RICHARD RAPP

IBM XT and compatibles, 330K RAM, hard disk—$189

FIFTH GENERATION SYSTEMS
10049 N. Reiger Rd.
Baton Rouge, LA 70809
(504) 291-7221

Circle Reader Service Number 318

LINKS CHAMPIONSHIP COURSES

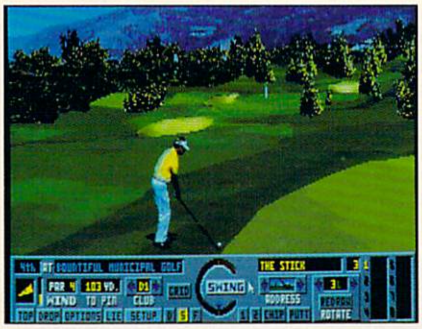
Access Software's hot 1990 release, *LINKS: The Challenge of Golf,* came with an incredibly detailed, digitized version of Torrey Pines South Golf Course in southern California. The designers promised additional courses—these are the first out of the chute.

Just a few miles from Access's former offices, you'll find the setting for the Bountiful, Utah, course—high in the foothills of the spectacular Wasatch Front Mountains. Access captured the course in the fall, with gorgeous colors festooning the mountainside in the background. (Firestone is also dressed in its autumn best.)

Since Bountiful is in the hills, the course has lots of up- and downhill fairways moving across steep hillsides. A ball hit out of the fairway may end up anywhere. Watch out for the windows of the nearby condos! I live on the Wasatch Front. I can testify that playing this course on the computer captures the look and feel of a brisk 18 holes in the mountains on a sunny fall day.

The Firestone Country Club of Akron, Ohio, is a world-class course, the site of many PGA tournaments. It's also a duffer's nightmare. The densely tree-lined fairways continually obscure your view of the pin. If you don't have precise control of your hooks and slices, you'll spend hours in the woods, hitting trees on almost every stroke.

In short, it's a challenge. You'll fine-tune your skills here—or vie for a spot in the Hall of Shame. There's no mid-



Access brings an autumnal Bountiful home to LINKS fans.

dle ground. These beautiful courses have been lovingly re-created in astounding detail, right down to the types, shapes, and colors of the trees, buildings near the course, and scenery in the distance. *LINKS* is a great game. With these realistic courses (and many more to come), it should remain popular indefinitely.

RICHARD O. MANN

IBM PC and compatibles, requires *LINKS: The Challenge of Golf*—$24.95 for *Bountiful Golf Course*—$24.95 for *Firestone Country Club*

ACCESS SOFTWARE
4910 W. Amelia Earhart Dr.
Salt Lake City, UT 84116
(800) 800-4880
(801) 359-2900

Circle Reader Service Number 319

VOLKSWRITER 4

Do the words *advanced, powerful,* and *professional* intimidate you? To the rescue comes the Volkswriter line of word processors, offering power and advanced capabilities with an inviting menu interface and simple commands. And while *Volkswriter 4* targets managers and professionals, anyone who's familiar with word processing will quickly pick up the commands.

Six tutorial files introduce such basics of word processing as storage, retrieval, and creation of files. These tutorials end with more complex capabilities, like changing type styles and layouts, using embedded commands, and creating macros. Extensive online help is also available at the touch of a key. By the time you work through the tutorials, you'll realize that even advanced word processing really isn't difficult, and you just might begin to enjoy it.

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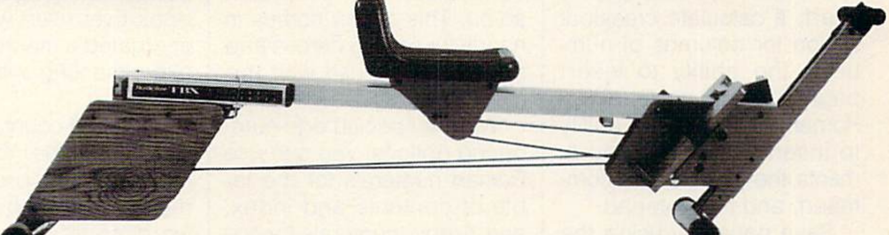

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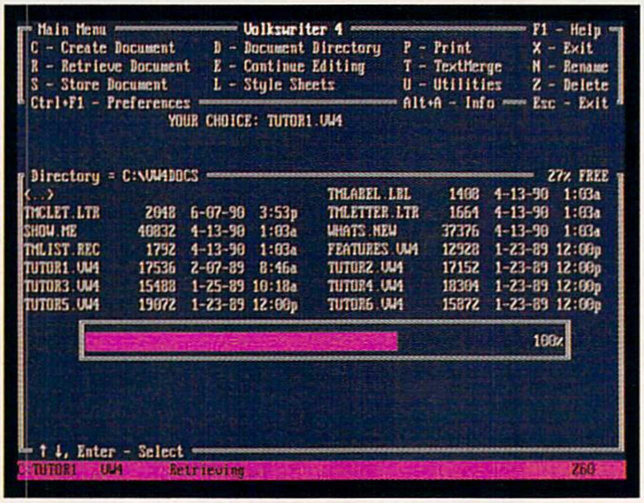
Maybe you want to carry work to and from the office. Don't worry if you receive files from coworkers in a different file format. *Volkswriter 4* automatically reads *WordStar* (3.3–5.5), *WordPerfect* (5.0 and 5.1), *Microsoft Word* (3.0–5.0), *Lotus 1-2-3* (releases 1 and 2), and *Displaywrite* files. And for an additional $69, you can purchase *Volks Word for Word*, a file-conversion utility that converts more than 30 file formats.

Unlike some other word processors, *Volkswriter 4* doesn't require you to change the type style of a document to print it with a different printer driver. *Volkswriter 4* tries to match the layout type styles with those of the new printer driver, or you can alter the type styles manually. Install or create type styles for specific purposes, such as inserting headers at the top of pages.

Noteworthy features in *Volkswriter 4* include page preview, a keyboard display chart, a calculate crossfoot option for columns of numbers, the ability to insert page numbers as Arabic or Roman numerals, the ability to insert nonprinting comments, the change case command, and the notepad.

Save paper by using the page preview option. (This option is only available for systems with a graphics card.) Embed special printing characteristics such as bold, italic, underline, subscript, and superscript easily, or send Escape codes to your printer with the CMD command. Or display the little known Ctrl key assignments in a box at the top of the screen with the keyboard assignment command; that way, you won't have to laboriously search for elusive key assignment tables in your DOS manual.

Calculate in column or row format, and use the crossfoot method to figure rows and columns simultaneously—instead of loading your spreadsheet for such simple calculations. You also can sort text columns in ascending or descending order by name, ZIP code, and so on. This option comes in handy for sorting names and addresses for use with the mail-merge option.



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Main Menu ════════════ Volkswriter 4 ═══════════════════ F1 - Help
C - Create Document    D - Document Directory   P - Print        X - Exit
R - Retrieve Document  E - Continue Editing     T - TextMerge    N - Rename
S - Store Document     L - Style Sheets         U - Utilities    Z - Delete
Ctrl+F1 - Preferences ════════════════════════ Alt+A - Info ══ Esc - Exit
                      YOUR CHOICE: TUTOR1.VW4


Directory = C:\VW4DOCS ═══════════════════════════════════════ 27% FREE
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TMCLET.LTR      2048  6-07-90  3:53p  TMLETTER.LTR    1664  4-13-90  1:03a
SHOW.ME        40832  4-13-90  1:03a  WHATS.NEW      37376  4-13-90  1:03a
TMLIST.REC      1792  4-13-90  1:03a  FEATURES.VW4   12928  1-23-89 12:00p
TUTOR1.VW4     17536  2-07-89  8:46a  TUTOR2.VW4     17152  1-23-89 12:00p
TUTOR3.VW4     15488  1-25-89 10:18a  TUTOR4.VW4     18304  1-23-89 12:00p
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Here the user-friendly Volkswriter 4 *displays some of its myraid available options on the main menu.*

With the special page-numbering options, you can use Roman numerals for the table of contents and index, and Arabic numerals for the rest of the document. And since capitalization typos occur often, the caps change command offers a quick way to correct the errors without retyping an entire word or line. *Volkswriter 4*'s notepad option lets you keep notes for yourself. If you think of something while working on a document, key it in and send it to the notepad. It will be cut from the current document and appended to a file that you specify.

Most word processors lack an easy way to use line characters to draw boxes around text. With *Volkswriter 4*, you simply highlight a block of text and use the Alt-B command to draw a double or single line box around the highlighted block of text.

Creating macros with *Volkswriter 4* poses no more threat than tying your shoelaces. Even users who've never created a macro will enjoy experimenting with this feature.

The word count command saves you time. You needn't move to the top of a document to get an accurate word count. To count the words in a specific section of a document, merely highlight the text in question before choosing the word count command.

More special features include mail merge, undelete (up to 900 characters), storage of blocks of text to a separate file, and printing in landscape or portrait modes. The most impressive capabilities of this package include the 310,000-word thesaurus and *Grammatik IV*.

You can purchase several accessories separately for a reasonable sum. These include an extended 610,000-word thesaurus; specialized dictionaries with computer, legal, and medical words; and multilingual dictionaries, thesauruses, and dictionaries.

This version of the program doesn't include mouse or bitmap graphics support or an indexing feature, but it wasn't intended to be another desktop publishing package, either. *Volkswriter 4* can be a useful tool for managers and other professionals and even students who need to meet term-paper deadlines (the footnote feature is outstanding). And with a 30-day money-back guarantee, you can't lose. This word processor truly puts the power of words into the hands of the people.

JOYCE SIDES

IBM PC and compatibles; 640K RAM; CGA, EGA, VGA, or Hercules (for print preview); hard disk—$249

VOLKSWRITER
One Lower Ragsdale Dr.,
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Monterey, CA 93940
(408) 648-3000

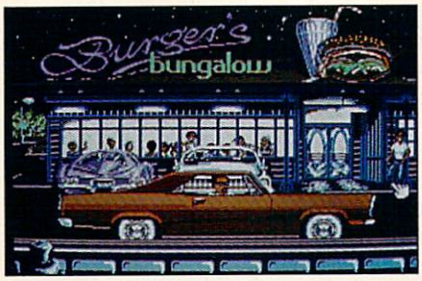
Circle Reader Service Number 320

STREET ROD 2

Do you want to be King of the Road without spending the big bucks for a top-quality racer? Do you lack the smarts to build a monster machine from scratch or the guts to push the pedal to the floor? If so, then *Street Rod 2* might be just your ticket.

You'll begin by selecting your first set of wheels and spare parts from the want ads. Even though there are 25 autos and 60 parts to choose from, with only $1,200 to spend, a Ford Fairlane and a few new tires are about all you'll be able to afford.

Next it's into the garage, where you can perform cos-



After a brief pit stop, cruise the streets searching for racing action.

metic surgery by spray-painting your monster, chopping its roof, and removing the bumpers. To improve your chances against the competition, pop the hood and tune your engine or bolt on a new part. With *Street Rod 2,* you can even roll under the body and do some serious work, adding differentials, mufflers, and exhaust manifolds. Eventually, substitute a top-performance manual transmission for that easy-to-shift, but decidedly inferior, automatic.

When you arrive at the local drive-in, sit tight until a beatable car cruises by. Then challenge the driver (male or female) to a drag race on a mile-long straight track or to a road race on either of two $2^1/_2$-mile courses.

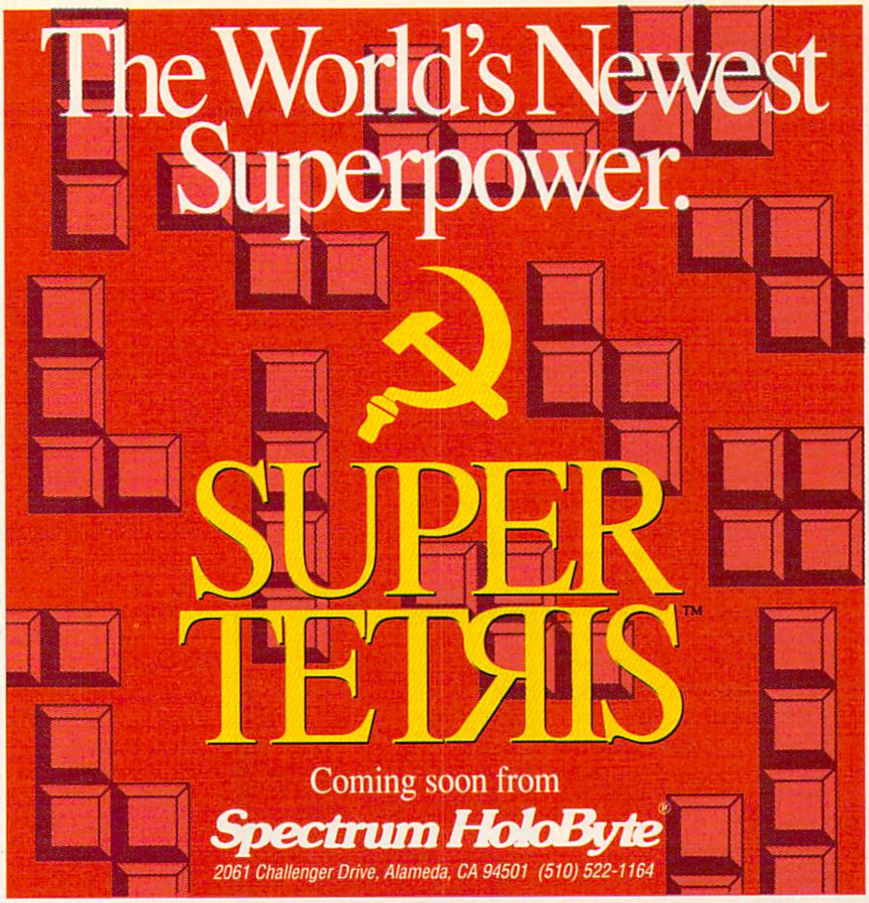
If you're not off the line fast enough on the drag strip, you'll eat mouthfuls of your opponent's dust. If you jump off too quickly, you'll blow your engine and yourself right out of the competition.

On the road, controlling your speed on turns and sensing when to brake and downshift are essential for victory and for continued good health. Be warned: Cops are everywhere, ready to ticket you if you can't outrun them.

A ruined engine, a dropped transmission, and other damages can be repaired—if you have the cash. At other times, you might want to write your heap off as a loss and junk it for a few bucks.

Three months is all the time you'll have to go from rank amateur status to being an opponent worthy of the King of Street Racing. Winning lots of races and regularly upgrading your vehicles with your earnings are the keys to victory. Don't expect to complete the program in one sitting; the save-game option comes in handy.

Though enjoyable and exciting, the racing sequences add little new to the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genre in terms of action or challenges. Whether using a mouse, joystick, or keyboard, you'll experience more than your share of killer crashes before you begin to master the controls. The garage segment is more original, and, thanks to a responsive point-and-click interface, easier to handle. In all locations the graphics, animation, and sound are excellent.

If you fantasize about the ultimate machine but you drive a ho-hum buggy, consider taking to the road with *Street Rod 2*. It won't make you think your Chevette is a Corvette, but it'll let you experience the sensation of driving a superfast monster car—without the danger and at a fraction of the cost.

LEN POGGIALI

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Also available for Amiga—$39.95

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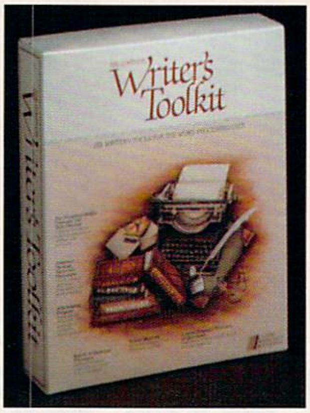
(800) 245-4525

Circle Reader Service Number 321

THE COMPLETE WRITER'S TOOLKIT

While it won't replace a serious writer's reference library and while one of its functions isn't quite up to scratch, *The Complete Writer's Toolkit* is a welcome addition to the resources available to the writer. *The Toolkit* contains six modules, as many or as few of which you can install as you like. Five of these—The American Heritage Electronic Dictionary, Roget's II Electronic Thesaurus, Written Word III, The Abbreviation Expander, and The Concise Columbia Dictionary of Quotations—can be made memory resident and hot-keyed into windows over your text within your word processor.

Three of these modules may get limited use: Written Word III is a reliable handbook on the basics of grammar, spelling, and punctuation, though its sections dealing with research papers and résumés are too general to be very useful. On the infrequent occasions you need it, The Abbreviation Expander provides the full terms for abbreviations you type into the Lookup Screen and allows you to add to its list, and The Dictionary of Quotations may actually slow down your writing—chiefly because of the temptation to linger and browse through the 6000 quotations which can be accessed by topic, author, or index, and imported directly into your text file.


Every serious writer needs a serious toolkit.

In a writer's toolkit, though, the real test cases are the dictionary and the thesaurus—and these are, surprisingly, better than I had hoped for. While not as comprehensive as its hardcover parent, The American Heritage Electronic Dictionary contains 115,000 entries and provides succinct but detailed definitions; you can also look up words *within* the definition simply by placing the cursor on the word and hitting Enter. The Spelling and Wildcard modes let you search for words even if you're unsure of their spelling, and there's even an Anagram mode for people who want to cheat at word puzzles.

While I wish Roget's II Electronic Thesaurus had been based on a more traditional model, its versatility makes it attractive. Type in your word, and the thesaurus window splits into two columns—one with the word's definitions, the other with its synonyms. Moving the cursor from definition to definition changes the displayed list of synonyms; tab over to the synonym column, and you can check the definitions for each of its words.

The sixth module, The Houghton Mifflin Grammar and Style Checker, is not memory resident but can be accessed from DOS if you want to check an imported text file for grammar, spelling, punctuation, and style. It also contains a Stats option that counts the words in your file and rates its readability. Anything that would reduce the drudgery of proofreading is welcome, but unfortunately, using The Checker is a little like having your work proofed by a C-level freshman comp student. Though it usually catches the most blatant errors, some subtleties escape it. For example, it may confuse participles with verbs or fail to recognize a gerund as a subject. And sometimes its advice is just wrong; in the sentence "The Grammar and Style Checker is weak," it reads *Grammar* and *Style Checker* as separate nouns and recommends you change *is* to *are*. The Checker allows you to enable or disable its grammar rules and thereby customize it to some extent; however, to use this option, you have to know enough about proper usage not to need it in the first place. Use it with caution.

Despite this weakness, the other modules of *The Toolkit* are serviceable online references. *The Toolkit* may conflict with some memory-resident programs, so you'll need to experiment a bit to see what it works well with. If you do have problems, check with the people on the support line listed below; I found them to be helpful and patient even with idiot-level questions.

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PLAN IT!

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Plan It! also offers investment strategies for insurance and college planning. The insurance module calcu-

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lates the value of your current policy and analyzes your life insurance needs and benefits. The college module suggests three financial options to safeguard a sufficient nest egg for your children's college education.

Each of *Plan It!*'s three modules calculates how much you need to save in order to attain your economic goals. Dollar projections depend upon financial data that you enter (that is, your income needs, age, interest earnings, and the annual inflation rate). You can print reports concerning "what if" scenarios, keep track of your investments with the software's portfolio management system, and use the financial calculator to determine loan payments. The program's menu-driven interface and context-sensitive online help simplify operation. If you feel like a financial ostrich, *Plan It!* pulls your head out of the sand and plants your feet squarely on the path to a secure retirement.

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Circle Reader Service Number 323

STUDYWARE FOR THE SAT

Competition can be a good thing, but it sometimes means heartbreak for high school students who've set their sights on attending a prestigious college or university. These students need an edge to improve SAT (Scholastic Aptitude Test) scores to get into those institutions, and help comes from *StudyWare for the SAT.*

StudyWare comes not only with an informative and easy-to-understand user's manual that offers strategies and tips for taking the SAT, but also with *Cliffs SAT Preparation Guide,* a sister publication of *Cliffs Notes. Cliffs Guide* offers two practice exams with removable SAT-like answer sheets. Also included in *Cliffs Guide* are a study guide checklist, a discussion of two approaches to taking the SAT, and strategies for completing each SAT section, including antonyms, analogies, sentence completion, reading comprehension, mathematics, and quantitative comparisons. All of these topics are covered in *StudyWare*'s useful practice exams.

Special features in the program include mouse support, pull-down menus, and an onscreen glossary with over 450 listings. There's also an onscreen clock to help you keep up with the amount of time you've used for each question.

To start, choose Test, Drill, or Exam. If you're interrupted, use the Pause option to stop the exam clock until you're ready to continue. Drills help to improve your speed, and with the Math Drills you can choose to practice squares and square roots, units of measure, word problems, algebraic operations, ratio/proportion, quantitative comparisons, geometry, and more. In Tutor mode, an explanation appears for the answer you choose, whether the answer's right or wrong.

Your scores are automatically tallied, and you can view the results in three ways: Topic Priority Breakdown, Items Missed, or Results Graph. The Topic Priority Breakdown displays 20 categories with the composite results of your correct answers. This report lists the page numbers in *Cliffs Guide* where you can study that topic.

I encountered a few curious typographical errors and a mismatched explanation for one of the math problems. When I called StudyWare, a spokesperson thanked me for calling and promised to send a disk with fixes to me and any registered user who calls the full-time technical support department.

I was impressed that *Stu-*

dyWare holds its own when compared with other SAT programs. It offers more than 800 onscreen questions and more than 4000 explanations. It also displays more true math symbols than the two other leading SAT programs by Barron's and Davidson and Associates.

If you're looking for a way to help your children score higher on the SAT, put *StudyWare* on your shopping list. Whether they're taking the SAT for the first time or the tenth time, they can't go wrong by studying more. *StudyWare for the SAT* is the perfect tutor, and with a price tag of $49.95, it's an investment in the future with potentially great returns.

JOYCE SIDES

IBM PC and compatibles, 256K RAM; graphics card, mouse, and hard drive optional—$49.95

STUDYWARE
4760 Murphy Canyon Rd., Ste. A
San Diego, CA 92123
(619) 495-0190

Circle Reader Service Number 324

Q-DOS 3

Even if you feel right at home with the DOS directory and file structure, you may find hard disk housekeeping tedious using only DOS. You may also have trouble every now and then remembering where you put a particular file, or, if you have more than one disk partition, where you put a particular directory.

One solution calls for a graphical user interface (GUI). Some of us don't like GUIs. They tend to be slow and to require such involved procedures that by the time you finish with all the GUI protocol, you might as well be back with DOS. A prime example of a better solution, *Q-DOS 3* won't slow you down at all. The program installation puts *Q-DOS 3* in your path statement, so you can call it from any directory. *Q-DOS 3* occupies only about 9.5K RAM and provides very convenient mouse support, though a mouse is not essential. The first option on its command line is Directory, and if you click on that option or type *D,* the directory structure of your current drive appears as a tree with your current directory highlighted. Want to change directories? Use the mouse or arrow keys to choose your destination, click again, and you'll see a listing of files in that directory, with size and date.

Want to look at another drive? Click on the Change Drive box, and you'll see a list of your drives. Click on a drive, and you'll see a tree of the directories and subdirectories of that drive. Click on your choice, and you move to that directory of the drive.

The *Q-DOS 3* command line remains available always. Can't find a file? Click the Find box on the command line. You'll be asked for the filename as well as whether you wish to search all drives or only the current drive.

Deletion of a directory which has subdirectories seems interminable using DOS. You must go from one subdirectory to another, deleting files, then return to the parent directory and delete the subdirectories one by one. Finally, DOS will let you delete the directory—unless there are hidden files somewhere, which the DOS Delete command will not touch. Not so with *Q-DOS.* One click brings up the tree, another highlights the undesired directory or subdirectory, a third gives the Erase command, and a fourth confirms that you really wish to do this, after which the directory and all its subdirectories and files, hidden or not, go away.

The program boasts many other fine features. To name just a few, you can alter file attributes (hidden, system, read only, and so on), rename files and directories, and erase or unerase files. Its response is snappy, and its documentation is good. Personally, I have habitually despised file handlers, grumbling, "I know how to handle my files and directories, thank you. I don't need any help from any dumb program." *Q-DOS 3* has changed my mind.

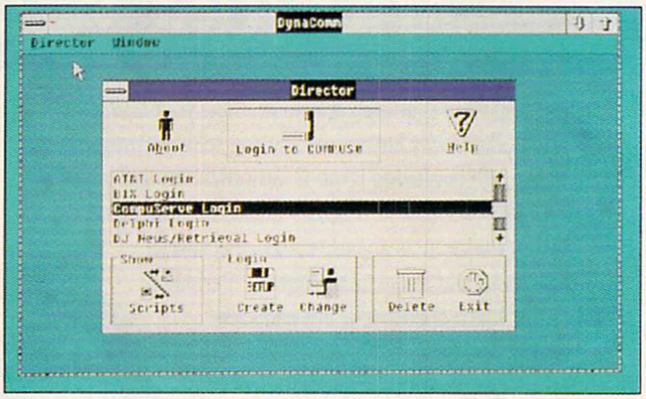
CHARLES IDOL

IBM PC and compatibles, 384K RAM—$99.95

GAZELLE SYSTEMS
42 N. University Ave.
Provo, UT 84601
(800) 233-0383

Circle Reader Service Number 325

DYNACOMM ASYNCHRONOUS



Use DynaComm's *script editor to automate your log-in procedures.*

For those who prefer mice and icons, telecommunicating in the PC environment can prove a tortuous affair. Many *Windows* 3.0 users were probably delighted to find a basic telecom and terminal emulation program, *Terminal,* right in *Windows.* FutureSoft, the company that wrote the admittedly limited *Terminal* for Microsoft, offers a fully loaded version called *DynaComm.*

No matter what network or computer you need to connect with, you'll find *DynaComm's* built-in flexibility comforting. *DynaComm* supports the most common binary transfer protocols, including XMODEM (checksum and CRC), YMODEM (batch mode), YTerm, Kermit, and CompuServe B+, but not ZMODEM, the fastest and most advanced protocol. The long list of terminal emulations includes DEC VT52, VT100, VT220 (but not VT102), ADDS VP/60, HP 700/94, IBM 3101, Televideo 925/950, and CompuServe's VIDTEX. Keyboard remapping proves an essential feature when communicating with a terminal that uses a keyboard layout different from that of the standard PC. The manual contains tables that list all the keyboard ASCII values for the terminals *DynaComm* emulates, if you really need to know.

Since you may carry out text transfers in the background, you can run other applications during uploads. In fact, *DynaComm* fully supports Microsoft's Dynamic Data Exchange (DDE). So, for example, the text file you've

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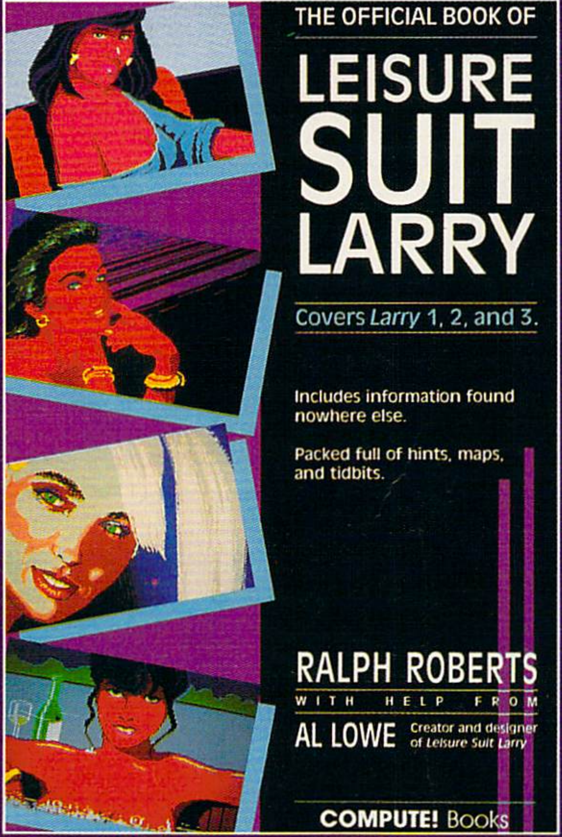

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WITH HELP FROM

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TURN & BURN: THE AUTHORITATIVE GUIDE TO FALCON

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Foreword by Gilman Louie

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just received can be automatically inserted into a *Microsoft Word* document, or, with the right script, a *Word* document can be uploaded automatically from *DynaComm.* Data can run both to and from *DynaComm* and other programs in multiple channels. Expect a severe reduction in program speed if there's much data exchange going on, though.

Another useful feature for avid telecommunicators is *DynaComm's* ability to open up to eight terminal windows simultaneously. Fully editable, terminal windows come with options for custom text styles, colors, tabbing, and formatting. You can also perform full search-and-replace operations, which become very useful when you receive lots of junk characters in a file.

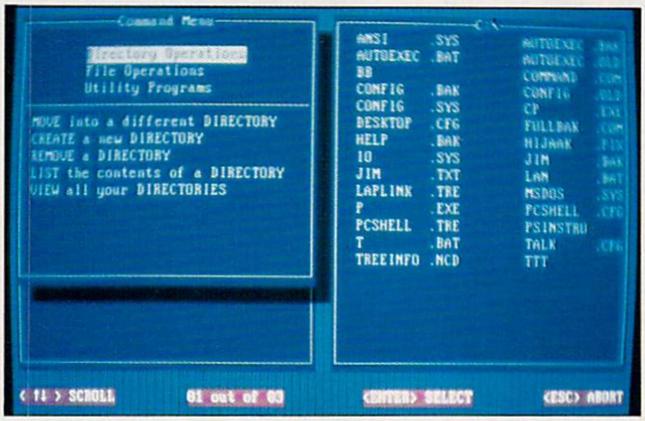
The *Director* program (really a special script) is *DynaComm's* home base. *Director* functions as an integrated phone dialer and phone book, and provides easy access to settings, files, and log-in parameters. You can choose most actions by clicking on buttons and making menu choices, so communicating becomes about as simple and friendly as possible. Through *Director* you can also create function key macros and scripts that automate communications chores. Many other environments are possible with *DynaComm,* but most users will stay primarily in *Director.*

If you need to write elaborate scripts, *DynaComm* includes a powerful, event-driven script language that also contains the tools to create custom user interfaces, complete with user-definable menus and dialogs. A 400-page manual shows you how to use the script language, but unless you have some programming experience you won't find it easy going.

Simple log-in scripts aren't too difficult (one is thoroughly explained in the manual), but a typical segment of one of the more elaborate sample scripts confounded me. Log-in procedure scripts for several of the more popular services, such as CompuServe and GEnie, come with *DynaComm,* so you may not need to wrestle with scripts until you're quite comfortable with the program.

Probably the easiest way to begin involves the Recorder script, which creates scripts of your actions as you make a connection. You can edit scripts created with Recorder as you gain proficiency. The manuals, especially the Script Reference, seem reasonably well written and complete, but they might be hard to follow if you only recently took up computer communications. I'd recommend the online tutorials instead. The online help's a possible supplement to the tutorials, but too often brief to the point of uselessness.

DynaComm has LAN support for NetBIOS and other LAN interfaces built in; most other communications programs make you buy special LAN versions. This in itself would recommend *DynaComm* to businesses using a LAN. The other attractive capability for *Windows*-based businesses is that users familiar with *Terminal* can use *DynaComm* right away and learn the more complex functions of the program as necessary. Or an industrious network administrator can write and install custom scripts so that the average user doesn't have to worry about advanced functions at all.



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PCSHELL   .TRE          PSINSTRU
T         .BAT          TALK     .CFG
TREEINFO  .NCD          TTT
```

PC-IQ *makes the austere DOS environment a more temperate one.*

As powerful a telecom program as you could ask for and definitely the most powerful one currently available for *Windows, DynaComm* still isn't for everyone, and not everyone should ask for it. If you communicate with only a few easily accessible systems, such as CompuServe or your boss's PC, then *Terminal* may be all you need; why pay for more? But for the professional telecommunicator with a need for advanced LAN compatibility and a desire to customize the *Windows* environment, *DynaComm's* the only choice.

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PC-IQ

I am enamored of icons, pull-down menus, and point-and-click control. However, I work in a DOS world, with its command line interface and cryptic error messages. As every PC computing enthusiast knows, typing appropriate commands at the infamous DOS prompt requires utmost precision. Typographical errors return puzzling responses such as *Invalid number of parameters* or *File creation error.* Enter *PC-IQ,* a natural-language DOS interface that uses artificial intelligence to translate DOS computerese into everyday language. Not only does *PC-IQ* understand plain English, but it asks for clarification when it can't interpret a command or when it requires more information to execute an instruction. Online help is always available. All documentation is clearly written. Even computer novices will not be intimidated.

In order to run *PC-IQ* and its associated utilities, you must install it on a hard disk. Installation is a breeze even though the *PC-IQ* directory takes up almost two megabytes of disk space. Be aware that *PC-IQ's* Install option modifies the path statement in your AUTOEXEC.BAT file and also makes changes to the default settings of your CONFIG.SYS file. You'll be able to retrieve the original files, however, because *PC-IQ* renames them

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with the extension OLD rather than overwrite them.

PC-IQ acts as an interface between DOS and the computer user, translating a variety of natural-language instructions into conventional DOS commands. When it operates in natural-language mode, it shows users how it translates "English" instructions into DOS, thus providing an opportunity for interested parties to learn DOS as they work. For example, in natural-language mode, individuals who want to view all directories on a particular disk simply type TREE C (where C is the name of the desired disk). *PC-IQ* also accepts SHOW, GET, and LIST as TREE synonyms.

Once you're in a directory, you can obtain a listing of all files simply by typing SHOW ALL FILES. To open a new directory, type SWITCH *x* (where *x* is the actual directory name). *PC-IQ* also accepts GOTO, GO, CHANGE, ACCESS, and even CD, the actual DOS command. Novices who prefer a menu-driven interface over natural-language typing can switch to the program's point-and-click mode. This directs *PC-IQ* to display program options from pop-up menus. Menu choices include directory- and file-level operations and several utilities. Each option, in turn, calls up a submenu of additional choices.

PC-IQ offers a convenient alternative to typing and provides a great way to avoid the DOS command line. Regrettably, *PC-IQ* doesn't support all DOS commands, and it doesn't always recognize backslashes. You can't issue batch commands or use strict DOS syntax. The program does let you create or remove a directory, recover a deleted file, and view or change the contents of an ASCII file, however. Supported file operations include copy, find, move, rename, create, and print, while disk-level commands consist of check disk, format disk, and diskcopy. The Autoload function makes it possible to run a designated application from a pop-up menu. The Set command enables you to configure your system with the correct time and date. A simple text editor lets you create and save ASCII files up to 64K in length.

PC-IQ has some nifty features. It comes with a built-in screen saver. Its database manager allows you to add new programs to the Autoload list or customize *PC-IQ*'s vocabulary so it recognizes alternate command synonyms. Entertainment files offer you a chance to play a game like Trivial Pursuit or read a series of famous quotations and interesting facts.

Primarily for computer novices, *PC-IQ* will benefit individuals who want to learn something about DOS without having to grapple with unwieldy commands. However, if the DOS prompt does not seem intimidating, you may find the program limiting. It supports relatively few DOS commands, it may run out of memory when other memory-resident programs run simultaneously, and its interface might slow you down. In the final analysis, it might be better to improve your PC IQ with a primer on DOS instead of using *PC-IQ*.

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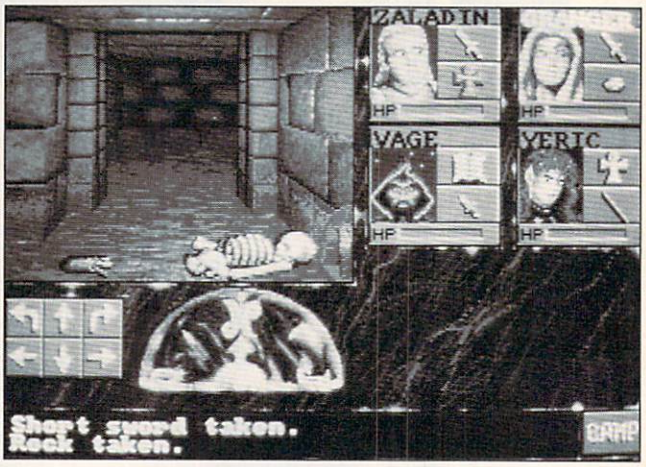
EYE OF THE BEHOLDER

On the fifth day of Marpenoth in the year of the Shadows Piergeiron, the chief lord of Waterdeep summoned me to a most solemn meeting. There was trouble in Waterdeep, and the source lay deep within the city itself. It would be my duty to uncover this evil and destroy it before it destroyed Waterdeep. With a Letter of Marque in hand, I quickly assembled a small band of hearty adventurers and set out to face the unknown source of evil. Unfortunately, the most logical place to begin my search was also the least hospitable—the sewers beneath the city.

Eye of the Beholder joins Strategic Simulations' Advanced Dungeons & Dragons line of fantasy role-playing games, and it's the first title in the groundbreaking new Legend Series. *Eye of the Beholder,* like all games in the new series, utilizes Advanced Dungeons & Dragons Second Edition game rules for combat resolution, character generation, and general gameplay. More importantly, however, the game represents a dramatic advance in sound and graphic quality for the Advanced Dungeons & Dragons line. For instance, as you search through the many labyrinths beneath Waterdeep, you hear the distinct sound of dripping water and the muffled footsteps of undead creatures. During combat, you hear the metallic clang of heavy weapons on armor and the ghastly cries and hisses of your dying foes as your party battles with bizarre monsters. The sewers are inhabited by a variety of creatures ranging from Giant Spiders and Zombies to Kobolds and Mantis Warriors. All monsters are carefully drawn and animated.



Short sword taken.
Rock taken.

Eye of the Beholder *takes you and your party deep into deadly, labyrinthine sewers.*

You can begin the game either by creating your own characters from scratch or, if you want to dive right in, by using a prebuilt party. *Eye of the Beholder* can be played entirely with keyboard input, or you can point and click your way through the adventure with a mouse or other pointing device.

As you explore the sewers below Waterdeep, the area directly in front of your party is visible through a large 3-D view window. To the right are character portraits of the four player characters and up to two nonplayer characters (NPCs) who may join your group during the adventure. Hand-held items such as weapons and spell books are shown alongside each portrait, and both combat and spell casting are accomplished by clicking on the appropriate icons. Below each portrait, characters' hit points are displayed either as a bar graph or, if you prefer, a numeric value. By clicking on a specific character's portrait, you access an equipment screen that graphically displays all of the character's belongings. Here, you can easily outfit a character by dragging weapons and armor from backpack to body. To feed your fearless warrior, you simply drag food from his or her backpack over to a small table setting and drop it on the plate.

A separate character screen supplies all the vital statistics on each character such as class, alignment, race, sex, ability scores, experience, and character levels. Convenient Next and Previous buttons on both the equipment and character screens let you access similar information on other members of your party without your having to first return to the main screen.

Eye of the Beholder is not without a couple of annoying faults. First, each time you load the game, you must specify the graphic mode and sound board you wish to use and indicate whether or not you want to use your mouse. Second, unlike many games that allow you to save multiple games by assigning each a unique name, *Eye of the Beholder* makes every game that you save automatically replace the previous one. Even with these glitches, *Eye of the Beholder* remains one of the most engaging fantasy role-playing games I've seen in a long time and one that no Advanced Dungeons & Dragons fan should be without.

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MAPVIEWER

Have you ever looked at a map and wanted to see the information displayed differently? Perhaps a job presentation or sales close could have benefited from a jazzier visual aid than an uninspired photocopy from an old sales manual?

MapViewer, from Golden Software, could be your answer. It allows you to use standard maps or create your own and customize them any way you want. This *Windows* 3.0 program helps you create great presentations and is a terrific aid to schoolwork.

Any discussion of technical software should start with a review of its most important and often most neglected component—the documentation. *MapViewer* comes with an intimidating 312 pages plus appendices to sift through. The manual contains an introduction, start-up procedures, a tutorial, an advanced features section, and a handy reference section.

Although the sheer volume of documentation may at first seem a bit overwhelming, it took me only about two hours to work through the tutorial and two hours to read the rest of the manual. Then I was ready to use *MapViewer.* I found the manual to be well written, concise, and generally readable; even the index appeared complete and dependable.

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Among the Few

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of the
DARK SAVANT

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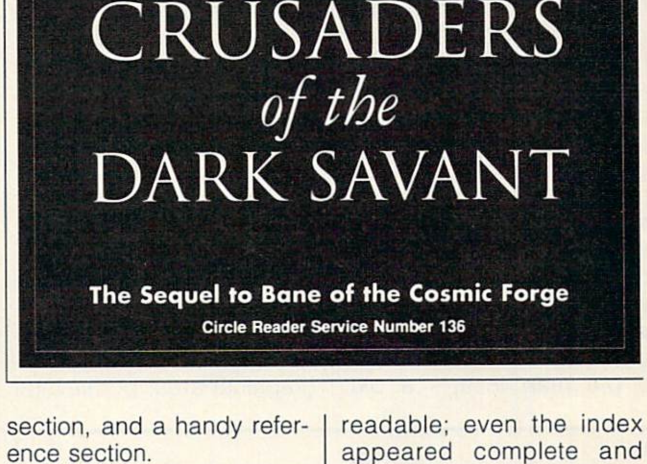
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300 to 70000
75 to 300
50 to 75
25 to 50
10 to 25
0 to 10
Select
Layer #1
105.844, 49.815

MapViewer *puts useful geographical data at your disposal.*

Most people will first experience *MapViewer* by running through the tutorial. When you first boot the program, a standard *Windows* screen with icons for map customization greets you. The tutorial then instructs you to import a data file of the fifty American states and a data file detailing the populations of each state. Then, using a simple spreadsheet, the tutorial reshapes the information into a variety of maps that display population ranges. For instance, a hatch map color-codes the country according to population density. A symbol map places appropriately sized human figures in each state. The bigger the person, the bigger the population. Choosing a prism map gives you three-dimensional states with the height of the state corresponding to the size of the population. A dot-density map fills each state with dots in proportion to the population. For incorporating more than one variable, a pie map inserts a pie chart into each state and allows for population breakdowns into categories such as male and female.

Next, you may print your data. Finally, the tutorial runs through the help screens and index. A tutorial in any manual is an indispensable tool in learning how a program works. You learn best by doing, and Golden Software deserves applause for including such a complete and usable tutorial in the manual.

After running the tutorial, you're ready to explore *MapViewer* on your own. The features included allow you to make your map three-dimensional, display two data variables for each geographical area, put several maps on one page, cover up parts of the map, or use the clipboard. In order to test the usefulness of the program, I constructed a map representing the spread of my personal business. This was an adequate test of the agility of the program, since my client base spans a large geographical area but is concentrated in very small groupings. I expanded the four counties surrounding me into an enlarged area and showed the remainder of the United States in a secondary map. For good measure and aesthetics, I then made the map three-dimensional and added color. Altogether, it took about four hours—one hour to enter the information into the spreadsheet and three hours to use the manual to figure out what I wanted to do.

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COMPUTE offers two different disk products for PC readers; the *SharePak* disk and *PC Disk*. *SharePak* is monthly and has a subscription price of $59.95 for $5^{1}/_{4}$-inch disks and $64.95 for $3^{1}/_{2}$-inch disks. A subscription to *SharePak* does not include a subscription to the magazine. *PC Disk* appears in even-numbered months and has a subscription price of $49.95, which includes a subscription to the PC edition of *COMPUTE*. You can subscribe to either disk or to both, but a subscription to one does not include a subscription to the other.

The quality of printing was fine on my HP laser printer at work, but the legibility on my inexpensive dot-matrix printer at home was quite poor; distinguishing the different shades in each map area proved difficult. A representation in the manual of how the different colors will show up in black-and-white printing would've been handy and certainly saved time. Another problem is the definition of the geographical representations. Blowing up the area in and around Kuwait (which we've all become familiar with) revealed a very simplistic rendering of the borders. Honestly, though, these quibbles with an otherwise unique and useful program don't begin to undermine its strength.

When I first received *MapViewer*, I struggled to justify its utility. Though undeniably well made, *MapViewer* made me wonder, "What can I use it for?" I found my answers. While other graphic business programs might sit on my shelf after reviews are written, *MapViewer* will stay on my hard disk. My son and I discovered (in my case rediscovered) the versatility and usefulness of maps. I know of no other tool as handy for supplementing a child's geographical education. In addition, its usefulness in supplementing business proposals recently became apparent—and since then, indispensable. I incorporated *MapViewer* into two presentations, and the results pleased me tremendously; my presentations were simply more impressive. For a program that on first glance appeared all but useless, a trip through the workings of *MapViewer* soon convinced me that its appeal should, geographically speaking, reach far and wide.

ADAM STARKWEATHER

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Personal Law Firm includes forms for a last will

Wizardry

And the visions
Appeared
as they never had
before

CRUSADERS
of the
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and testament, living will, and residential lease. You can set up or revoke a power of attorney; create prenuptial, postnuptial, or marital settlement agreements; and authorize a temporary guardian for your children. Other forms help you put together a commercial real estate lease, agreements that safeguard trade secrets or intellectual property, work-for-hire contracts, promissory notes, and personal guarantees. Draw up a bill of sale, make a formal offer to purchase, issue demand letters, and more.

Once the program has been installed, just push a few buttons, answer some questions, and out pops a customized form. The program allows individuals to create a new document, revise an existing document, or print a hardcopy of a completed document. Onscreen prompts give directions every step of the way, and you can expect online help for any question you might have.

Our family lawyer, a practicing attorney in the state of Massachusetts, says that *Personal Law Firm* has potential. Ordinary folks shouldn't have to run to a legal professional for routine paper processing, especially when it comes to documents like a power of attorney, promissory note, or bill of sale. While the laws of different states may vary, these basic forms often prove legally valid in most jurisdictions.

On the other hand, our lawyer points out that blind faith in some *Personal Law Firm* documents could spell danger. For example, in the matter of a commercial real estate lease, virtually no such thing as consumer protection exists. If you execute a commercial lease without going to a lawyer, you can inadvertently leave out important provisions that protect your interests.

Your unease may heighten when you consider that *Personal Law Firm* documents were created by a member of the California bar. Laws tend to differ from state to state. For example, if landlords use the standard form for a residential lease (designed for nationwide application) in Massachusetts, they could get into serious trouble by overlooking specific state requirements concerning move in/move out inspections, escrow accounts for damage deposits, maximum limit for damage deposits and last month's rent, and other landlord obligations. These landlords could be forced to return tenant damage and security deposits before the end of the lease. They could even end up paying their tenants up to triple damages and attorney's fees.

A step in the right direction, *Personal Law Firm* could benefit people preparing a document for legal review. Clients might not save any money in attorney's fees, however, because lawyers often charge a set fee for completing particular documents, regardless of whether or not the client prepares an outline.

Probably best suited for a typing service run by a skilled independent paralegal, *Personal Law Firm*'s forms require the attention of someone who knows when it's appropriate to fill in the blanks and when it's necessary to approach a lawyer. Our lawyer cautions that a little bit of knowledge, posing as expert advice, can be as dangerous as an outdated law book.

The whole thrust of *Personal Law Firm* seems to suggest that individuals do not need a lawyer for certain documents. The packaging states that the software "creates documents that are valid in 49 states and the District of Columbia." Yet a tiny note at the bottom of the box says, "BLOC Publishing offers no warranty, express or implied, as to the legality of these documents in your particular state." This disclaimer appears intended to absolve BLOC Publishing of any liability. With the possible pitfalls in mind, exercise caution when creating your legal documents. Ultimately, the price of mistakes will be paid by you.

In future versions of *Personal Law Firm,* I'd like to see documents tailored to the laws of specific states. I'd also like BLOC Publishing to have its attorneys include the citations which specify the legal basis for the documents included. If nothing else, the program provides some insights into the legal system that laymen might otherwise never investigate. Citations would add to the educational value. For safety's sake, though, don't rule out an attorney or a typing service run by an independent paralegal. In law, as with the medical profession, it's sometimes wise to seek second opinions.

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STUDYMATE— THE GRADE BOOSTER

One commonly held educational theory states that a critical aspect of learning is the development and strengthening of study skills. Capitalizing on this notion is Compu-

Teach's *Studymate—The Grade Booster* 2.2.

Studymate does not pretend to be a program that teaches study skills. It leaves that multifaceted task to David H. Griswold's *How to Study*, a 148-page paperback enclosed as a bonus. Essentially a test-construction kit, *Studymate* provides a tool to help students organize their learning, review it in many different formats, and absorb it through repetition.

The main program consists of two parts—Editing Functions and Taking a Test—both accessed via a series of keyboard-controlled menus. From the Editor menu, you may create, edit, review, print, delete, or copy a test. In addition, you can call up a disk directory that contains not only each filename but also a brief description of all exams on the disk, the style of questions they use, and who wrote them.

Taking for granted that you already know how to write a test, the documentation offers only a few tips on how to go about doing so. Fortunately, viewing some of the 75 different 20-question quizzes included on the Vocabulary Power Disk will give you ideas for framing questions, as well as help you improve your word usage.

Teachers using software for their pupils or parents generating quizzes for their children should have no trouble manipulating the Create function or thinking of ideas for tests. Likewise, bright students who need review in certain subjects will find the program easy to handle.

Slower learners, however, will be hard-pressed to locate the relevant facts and ideas and to formulate them into meaningful questions. Although the program is best employed for teaching knowledge- and comprehension-based material, to construct items for it requires higher levels of learning, such as analysis and synthesis. This might make the Create function of *Studymate* inaccessible to many of the very people it is trying to help.

In the right hands, the Create module may be used to produce a wide variety of tests: true/false, multiple choice, fill in the blanks, spell scrambles, missing letters, and combinations of the above. Noticeably absent are matching columns, a test format commonly used by teachers of all grades.

Each test type has its own unique options and template. For instance, from the Multiple Choice menu you may determine the total number of responses and enter your own incorrect choices or have the program randomly assign them. After making your selections, you move to the template and fill in your first question, the correct reply, and the incorrect answers (unless randomly chosen) in the spaces provided. In this way you may create

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as many items as disk space allows.

After completing your exam, you may administer it either on screen or via hardcopy. If you choose the former, access the Take a Test module and then load in the file, and you're ready to go. As a test giver, the computer flags mistakes and will usually offer you a second chance. If you're still in the dark, the program supplies the correct answer. When you're done, you're told the number and percentage of correct replies and the time it took to complete your work. Then you may decide to print the results, to be retested on the items answered incorrectly, or to retake the entire examination.

If you're preparing to take a test, *Studymate* provides solid value at a reasonable price. It won't study for you, but it will help when you decide to crack the books.

LEN POGGIALI

IBM PC and compatibles, 384K RAM—$49.95

Also available for Apple II Series—$49.95 and Macintosh—$49.95

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Circle Reader Service Number 332

CENTRAL POINT ANTI-VIRUS

You know that feeling you get when, after a complete physical examination, the doctor shakes your hand and tells you you're as fit as a fiddle? Well, that's how I feel since installing *Central Point Anti-Virus* on my hard drive.The program assures me that my system is free of computer viruses. *Central Point Anti-Virus* not only checks your entire system for any signs of viruses but also can remove viruses from infected files and provide continuous protection from infection. That supplies invaluable peace of mind.

Central Point Anti-Virus recognizes more than 400 viruses—nasty little bugs with names like Dark Avenger, Chaos, Disk Killer, Leprosy, Beast, and Friday the 13th. Even more frightening than the names of viruses is the wide range of symptoms you're likely to encounter if the viruses manage to infect your system. Symptoms range from the annoying (files increase in size, your system slows down, music plays over your PC speaker, or mysterious messages appear) to the disastrous (your hard drive reformats!).

Two memory-resident utilities, *VSafe* and *VWatch,* provide continuous protection. The highly configurable *VSafe* uses 22K of system memory and monitors your system at all times for suspicious activity. If free memory's scarce on your system, substitute the 8K *VWatch* instead. *VWatch* checks for the presence of known viruses each time a program executes or a disk is accessed.

You can install either utility as a COM file or as a driver. As COM files, the utilities can easily be removed from memory at any time with a couple of keystrokes. You can't disable the driver versions of these utilities, but since they load into memory before COMMAND.COM, they automatically check this file for viruses.

Bootsafe, a utility run from your AUTOEXEC.BAT file, protects your system against viruses that try to infiltrate the boot sector on your hard drive. During installation, the program creates images of your boot sector and partition table and stores them in a hidden image file in the root directory of your hard drive. Then each time you boot your system, the program looks for existing boot sector viruses by comparing the current boot sector and partition table with those in the image file.

As with *VSafe* and *VWatch, Bootsafe* is completely optional during installation. If you don't think you need continuous protection, you can simply load *Central Point Anti-Virus* periodically to scan for viruses. If you choose to use the program in this manner, it will even remind you at regular intervals (user-selectable from one week to three months) to scan your system. Despite the sophistication of *Central Point Anti-Virus,* the program remains very easy to use, with context-sensitive help available at all times and a clear and extremely thorough manual. Besides telling you everything you need to know to use the program, the manual explains how the program works and includes a 43-page Virus Dictionary, which lists close to 200 viruses and describes in some detail their symptoms and infection mechanisms. In addition, you can count on support from the Virus Protection Service Plan, which provides registered users with a virus hotline, quarterly mailings, online support via Central Point's BBS (or CompuServe), and one free upgrade. Now, that's a comprehensive PC health package.

BOB GUERRA

IBM PC and compatibles, 512K RAM—$129, $30 for registered owners of other Central Point products

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WINDOWS 3 POWER TOOLS

If you're interested in becoming a *Windows* power user, this is the book for you. Instead of concentrating on get-

Wizardry

*I have died
of untold fear
and horror,
but my secret is safe—
for now*

CRUSADERS
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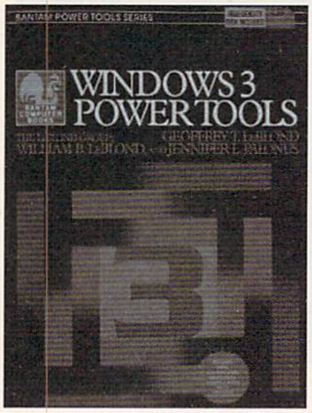
ting-started information or the basics of using *Windows* accessories, this book-and-disk combination focuses on *Windows* itself, and it includes solutions to lots of knotty problems that plague intermediate and advanced *Windows* users.



Windows 3 Power Tools *works the kinks out of* Windows.

Windows 3 Power Tools delivers information on almost every aspect of running *Windows*. Early chapters deal with mastering *Program Manager, File Manager,* fonts, and *Recorder*. More advanced sections follow on *Clipboard* and DDE, memory management, and customizing *Windows*. The final chapters concentrate on improving the performance of *Windows* and using *Windows* on a network.

The section on *Windows* memory management is especially noteworthy. It's the clearest discussion of *Windows'* three modes of operation and how *Windows* uses expanded and extended memory I've read. There's also useful information on high-memory managers like QuarterDeck's *QEMM*.

The chapter on improving *Windows'* performance is excellent as well. If you've wondered what arguments you should *really* use to optimize *SMARTDrive's* performance, this chapter will clear up the confusion.

In addition to these tips and techniques, *Windows 3 Power Tools* includes a disk full of some notable *Windows* software. Included are *Oriel*, a batch language for *Windows; Command Post,* Wilson Windoware's replacement for *Program Manager; Aporia,* a true object-oriented interface to *Windows;* and *IconDraw,* an icon editor. All are worth a look.

Since *Windows* 3.0 hit the scene, scores of *Windows* 3.0 books have appeared. *Windows 3 Power Tools* is the best one yet.

CLIFTON KARNES

Authors: The LeBlond Group—Geoffrey T. LeBlond, William B. LeBlond, and Jennifer L. Palonus
664 pages—$49.95

BANTAM COMPUTER BOOKS
666 Fifth Ave.
New York, NY 10103

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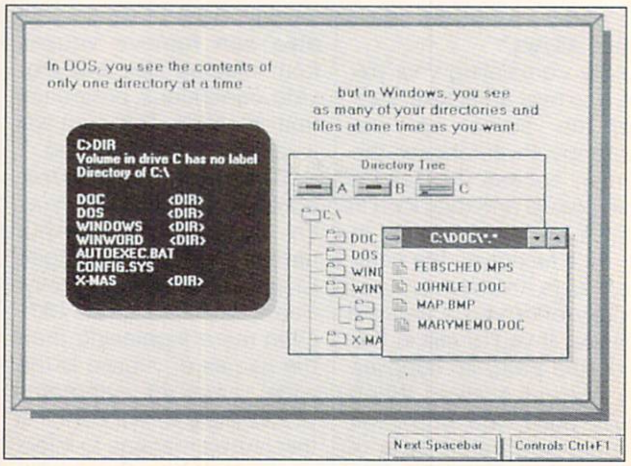
MICROSOFT PRODUCTIVITY PACK

If *Professor Windows* is for the computer-shy, *Microsoft Productivity Pack* is intended for the computer-literate. Its purpose is the same, teaching basic *Windows* skills to the new user, but it places greater confidence in that user's study habits and familiarity with computers.

The largest of the three modules included in *Productivity Pack, Learning Windows* provides sections on Getting Started, *Windows* Essentials, Working with Applications, Managing Your Files, Organizing Your Work, and A Day with *Windows*. Graphical representations of historical and fictional characters lend each presentation a creative touch. Cleopatra, for instance, multitasks several *Windows* applications while designing the pyramids.



In DOS, you see the contents of only one directory at a time . . .

. . . but in Windows, you see as many of your directories and files at one time as you want.

```
C>DIR
Volume in drive C has no label
Directory of C:\

DOC          <DIR>
DOS          <DIR>
WINDOWS      <DIR>
WINWORD      <DIR>
AUTOEXEC.BAT
CONFIG.SYS
X-MAS        <DIR>
```

Microsoft Productivity Pack *explains the fundamental differences between* Windows *and DOS.*

Productivity Pack doesn't quiz you as lessons proceed, so take notes like a good detective. You'll conclude *Learning Windows* by using the environment to help Sherlock Holmes solve a case. This calls on all your recently developed skills, and while you can always tab through this section to get at *Productivity Pack's* answers, who wants to fail Sherlock Holmes?

The other two *Productivity Pack* modules, *Quick Troubleshooting* and *Working Smarter*, are simply fancy titles for problems and hints. Both topics offer *Windows* Help–style access to simple but effective information. These two areas give the impression of providing more material than they actually cover because many of the extensive help subbranches lead back to a relatively small number of answers.

Productivity Pack is a refreshing, hands-on approach to learning about the GUI that conquered America. While you may find all the same information in the *Windows* manual, you won't get all the fun pictures.

BARRY BRENESAL

IBM PC and compatibles, *Windows* 3.0 or later—$59.95

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Redmond, WA 98052-6399
(800) 426-9400

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OPTIONS

Does the dreaded DOS command line interface get you down? Do your typing skills give rise to a *File Not Found* response more frequently than you care to admit? Do you have difficulty remembering obscure nested directory paths? Then replace the infamous DOS prompt with *Options'* point-and-click interface.

Options typically installs in the C drive and modifies your AUTOEXEC.BAT file to execute automatically at startup. Alternatively, you could access the system by entering MENU at the DOS prompt. Menu options execute DOS commands,

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launch programs, or run batch files.

The program features time-saving macro capabilities, password protection to limit access to designated users or particular directories, plus a screen saver that blanks the screen after a user-specified length of time. You also get Tracking Control to keep records of computer usage, a Stopwatch function for time tracking (great for keeping time records on client phone calls), and pop-up calendar, calculator, and memory map accessories.

Options automatically loads functions into extended memory in order to lessen the amount of conventional memory required to run the application. Pull-down menus in the Edit mode and context-sensitive online help assist with program operation. The package provides users with several convenient features in one handy location. Isn't it time you considered your options to maximize productivity, guarantee system security, and minimize operator error?

CAROL HOLZBERG

IBM PC and compatibles, 384K RAM, hard disk; mouse recommended—$89.95

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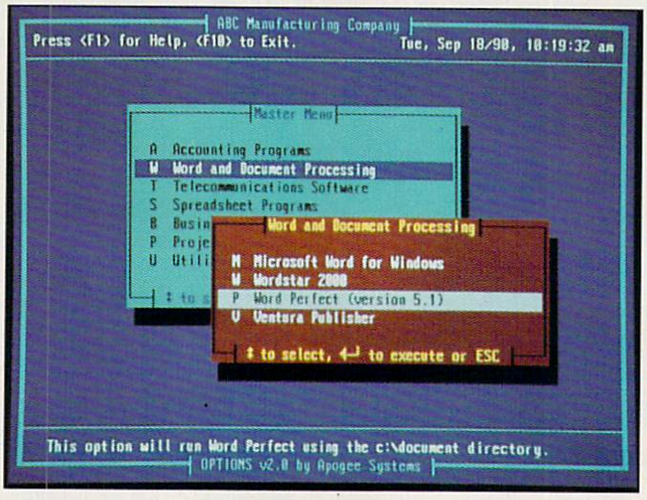
(403) 265-0675

Circle Reader Service Number 336

PROKEY PLUS

Popular with experienced computer users, macros sometimes perplex or intimidate computer novices. Even a novice, however, can appreciate the advantages of macros. Substituting a single keystroke for a series of strokes, macros save time and prevent typing errors.



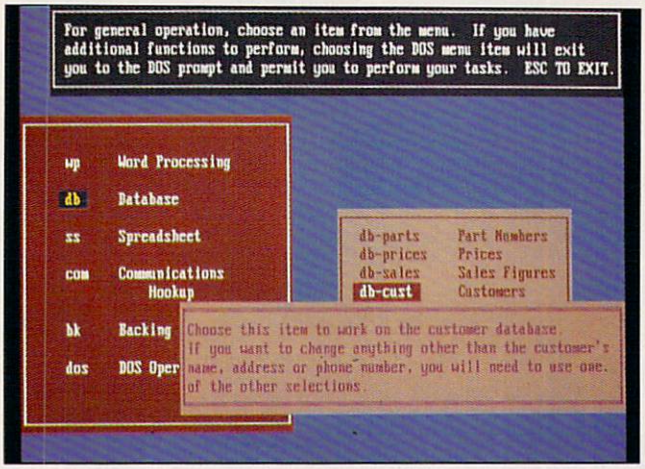
```
ABC Manufacturing Company
Press <F1> for Help, <F10> to Exit.          Tue, Sep 18/90, 10:19:32 am

                 Master Menu
         A  Accounting Programs
         W  Word and Document Processing
         T  Telecommunications Software
         S  Spreadsheet Programs
         B  Busin    Word and Document Processing
         P  Proje
         U  Utili  M  Microsoft Word for Windows
                   W  Wordstar 2000
                   P  Word Perfect (version 5.1)
                   V  Ventura Publisher

                   ↕ to select, ↵ to execute or ESC

This option will run Word Perfect using the c:\document directory.
                  OPTIONS v2.0 by Apogee Systems
```

Exercise your options and do away with the DOS prompt.



```
For general operation, choose an item from the menu.  If you have
additional functions to perform, choosing the DOS menu item will exit
you to the DOS prompt and permit you to perform your tasks.  ESC TO EXIT.

 wp    Word Processing

 db    Database
                                     db-parts    Part Numbers
 ss    Spreadsheet                   db-prices   Prices
                                     db-sales    Sales Figures
 com   Communications                db-cust     Customers
          Hookup

 bk    Backing  Choose this item to work on the customer database.
                If you want to change anything other than the customer's
 dos   DOS Oper name, address or phone number, you will need to use one.
                of the other selections.
```

ProKey Plus *helps you write macros for every occasion.*

Like most shortcuts, macros have some drawbacks. Creating macros so that Ctrl-E produces the closing lines of a letter and Ctrl-H writes letter headers only saves time if you can remember which key does what. *ProKey Plus* solves this problem. To help you write macros, *ProKey Plus* lets you annotate them. When you list your macros, you'll see a description of what a hot key does, rather than the usual litany of the component keystrokes. *ProKey Plus,* which occupies about 67K of RAM, interposes itself between your keyboard and any application you may be running. This means that you can use the program to define or execute macros from within your application programs.

Modern word processors are notorious for the complex keystroke sequences necessary to invoke their commands. *ProKey Plus* provides an alternative; I tested it with *WordPerfect,* arguably the word processor that puts you through the most rigorous keyboard gymnastics, and it worked satisfactorily. *ProKey Plus* is quite rapid in its response. I fault it only on its documentation. The manual is not tutorial in nature and needs more explicit examples. Even so, *ProKey Plus* in your library might go a long way toward easing the tension between you and your word processor!

CHARLES IDOL

IBM PC and compatibles—$129

ROSESOFT
P.O. Box 70337
Bellevue, WA 98007
(206) 562-0225

Circle Reader Service Number 337

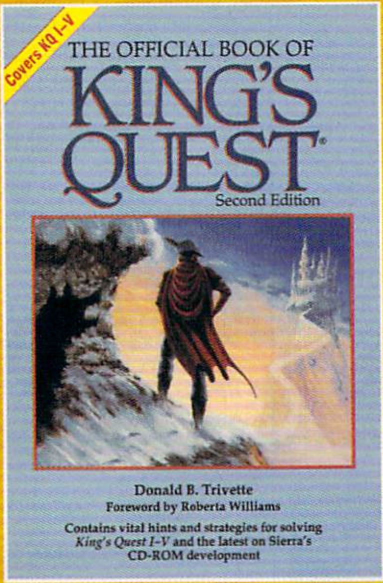
PC USA

How many outdated atlases, dictionaries, and encyclopedias do you have gathering dust? Well, for the atlas at least, the days are numbered. *PC USA,* a computer atlas program available from PC Globe, offers both a graphic representation of the United States and a comprehensive database of all sorts of useful and trivial facts. Now you need never miss a question in the geography section of your favorite trivia game.

In order to access all this great information, you use a standard imitation *Windows* interface. Commands lined all along the top of the United States map allow you to determine which database you want to enter and the level of detail involved. You'll also find mighty helpful the small insert that describes how to run *PC USA* through *Windows* 3.0.

The manual itself adequately describes installation and all the various databases, though I ran the program effectively without much preparation. You also get a complete bibliography, which proves vital when determining the accuracy and currentness of the abundant information utilized in the program.

GET THE OFFICIAL CLUES TO THE HOTTEST GAMES!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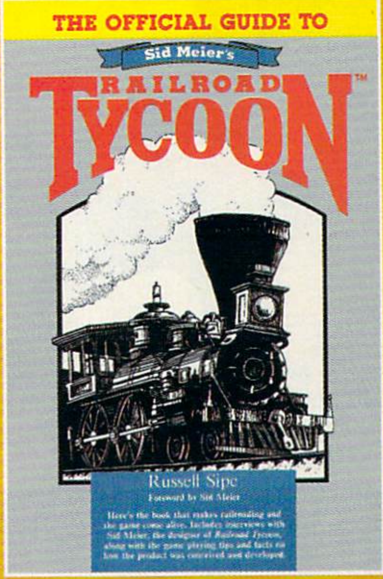
Foreword by Roberta Williams
Contains vital hints and strategies for solving King's Quest I–V and the latest on Sierra's CD-ROM development


THE OFFICIAL GUIDE TO
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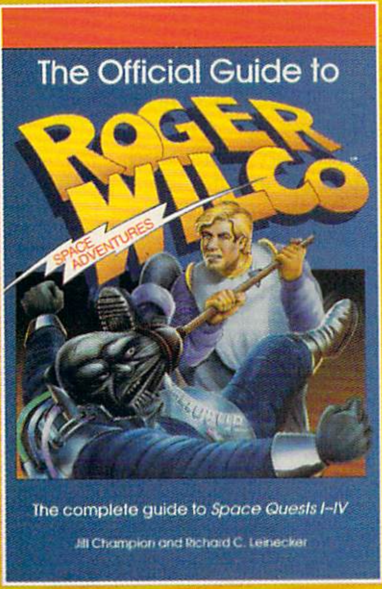
RAILROAD TYCOON
Russell Sipe
Foreword by Sid Meier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The rather lackluster relief maps of the various states disappointed me a bit. Whether the Rockies or the Appalachians, all mountains resemble anthills, and with the exception of rivers, no real terrain differentiation shows. Also, even though *PC USA* utilizes music, no sound boards are supported. Finally, technical support calls aren't toll-free.

The abovementioned minor problems hardly mar the most comprehensive and useful geographical database I have seen. *PC USA*'s applications seem as numerous and varied as the people who will use them, and I can't recommend this program more highly. Now, if I could just find something to replace those clunky volumes of encyclopedias.

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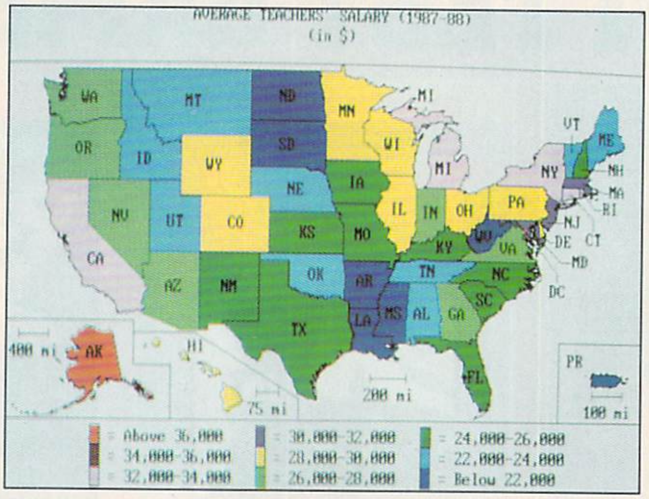

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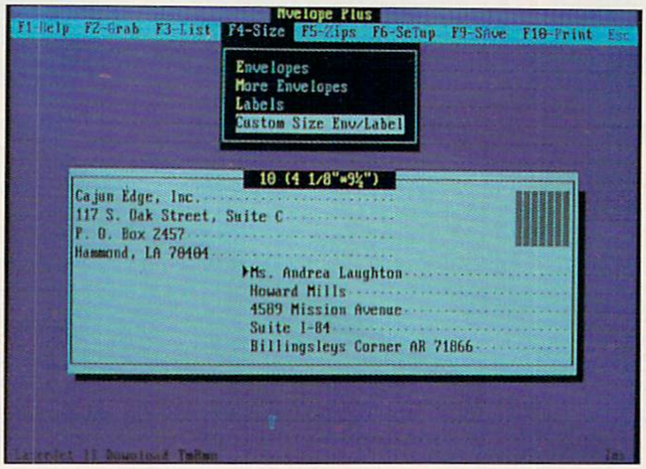

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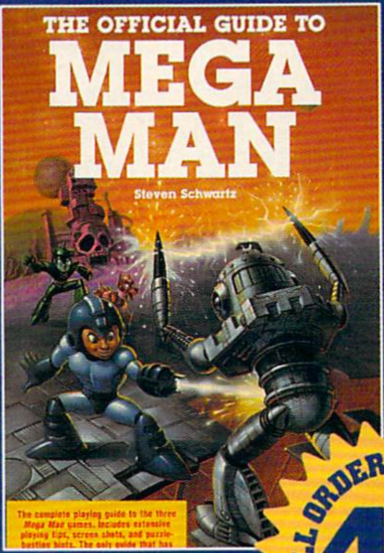
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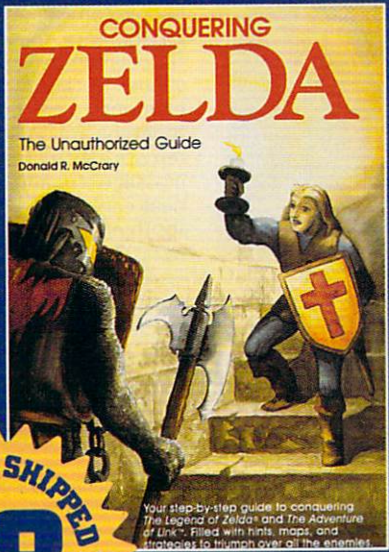
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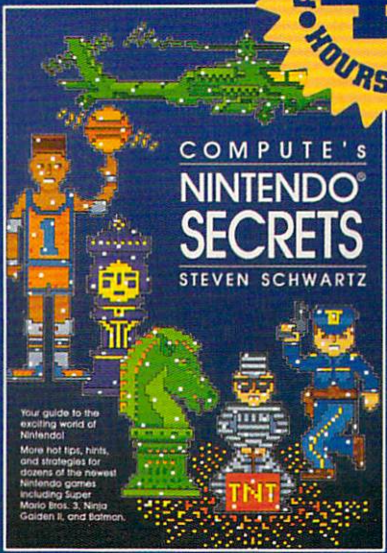
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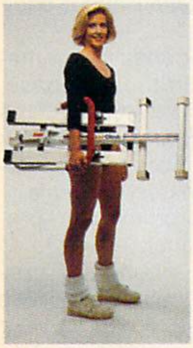

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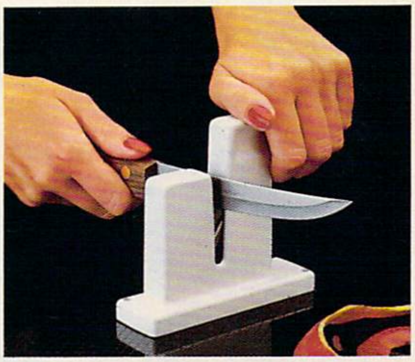

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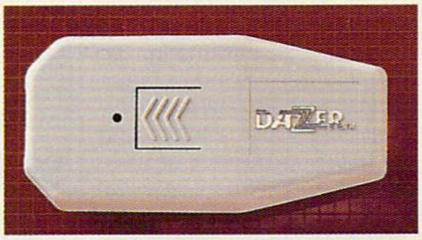

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159	900 Software	158
107	Abracadata	155
161	Access Software	118,119
142	Action Management	154
162	Bare Bones Software	A-11
112	BOBCO	G-6
207	CH Products	13
166	Citizen	7
184	Commodore	69
103	CompuServe	17
118	Computer Business Services	157
114	Computer Direct	42,43
141	Computer Productions	157
137	Covox	158
125	Creative Labs	2
139	Creative Specialties	G-21
	Damark	71
165	Data East	111
148	Davidson	21
120	DCS Industries	57
180	Delphi	72
131	DemoSource	156
171	Digital Dynamics	A-25
	Disk-Count Software	155
	General Car Rental	9
197	GEnie	5
149	GFXBase	A-15
128	The Grapevine Group	G-14
117	Holosoft Technologies	A-28
	The Hunter Group	120
177	IHT Software	G-21
190	I. Leonard & Company	156
134	Interplay	IFC
135	Interplay	1
111	Lucasfilms	85
183	Lucky Computer	155
127	LWS Software	157
	Magalog Marketing Group	150,151
146	Meggido	A-5
	MicroLogic	23
138	MicroMiga	A-28
158	MicroProse	105
157	MicroProse	27
169	MicroProse	117
153	Mission Control	137
186	Montgomery Grant	A-3
187	Montgomery Grant	G-5
133	Motion Blur Publishing	A-19
176	My Storybook	156
	National Videotex Network	81
153	New World Computing	IBC
119	Nordic Track	129
122	NRI/McGraw Hill	64,65
196	NSI Computer Products	88,89,90,91,92,93,94,95,96
104	Origin	11
185	Poor Person Software	A-19
199	Power-Up	48
157	Power-Up	49
193	Professional Cassette	25
151	Professor Jones	154
168	Psygnosis	109
116	SeXXy Software	158
154	Sierra OnLine	BC
136	Sir-Tech	139,141,143,145
109	Smart Luck Software	156
121	Software of the Month Club	155
126	SoftShoppe, Inc	156
	SOGWAP	G-15
152	Spectrum Holobyte	15
173	Spectrum Holobyte	131
167	Spectrum Holobyte	129
130	Starware Publishing	157
191	Strictly Personal	133
170	Tenex	G-13
132	The Other Guys	A-13
195	Universal Memory	34, 35
198	Villa Crespo	103
178	Virgin Games	122,123
179	Virgin Games	124,125
105	Virgin Games	103
172	Wedgwood Computer	157
118	WOL/Learning Adventure	53

Amiga Disk Resource	A-23
Amiga Resource Subscription	142
Best Amiga Utilities Disk	A-29
COMPUTE Books	60,115,131,135,147,149,156,G-9
COMPUTE Subscription	113
COMPUTE's GEnie OnLine	55
COMPUTE's Quantum Q-Link	G-7
COMPUTE's "The Hot Disk"	47
Gazette Disk Library	G-11
Gazette Disk Subscription	G-15
Gazette Productivity Manager	G-17
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A graphically oriented environment's bound to throw longtime DOS users a curve or two, but learning the basics of *Windows* shouldn't cause any anguish. If you've been holding off installing *Windows* because you dread the climb up the learning curve, look to *Professor Windows* for a lift. It's a friendly program that walks you through the sometimes confusing world of *Windows*.

Using either the mouse or the keyboard, you can learn about such matters as simple graphics objects, *Windows* accessories, getting help, and printing. Subjects are arranged in six areas (startup, basics, tasks, printing, accessories, and advanced), and you can move ahead or back one screen, or jump completely out of a tutorial at any time.

Though elementary, treatment of the material proves effective within its defined boundaries. Users answer simple multiple-choice questions on newly learned facts. A bar display of continuing progress through each lesson sustains the sense of accomplishment.

Ironically, in spite of *Windows'* multitasking environment, *Professor Windows* won't load when anything else remains open, excluding *Program Manager*. It will freeze if you run it under a *Windows* shell (like *DC Windows Express* or *PubTech File Manager*).

Professor Windows won't help everyone; it's strictly for novice users and probably not advanced enough for longtime PC users. *Professor Windows* does assuage computer anxieties if you have them, and if you need a little assistance to jump-start your *Windows* career, *Professor Windows* could be just the patient tutor that you've been waiting for.

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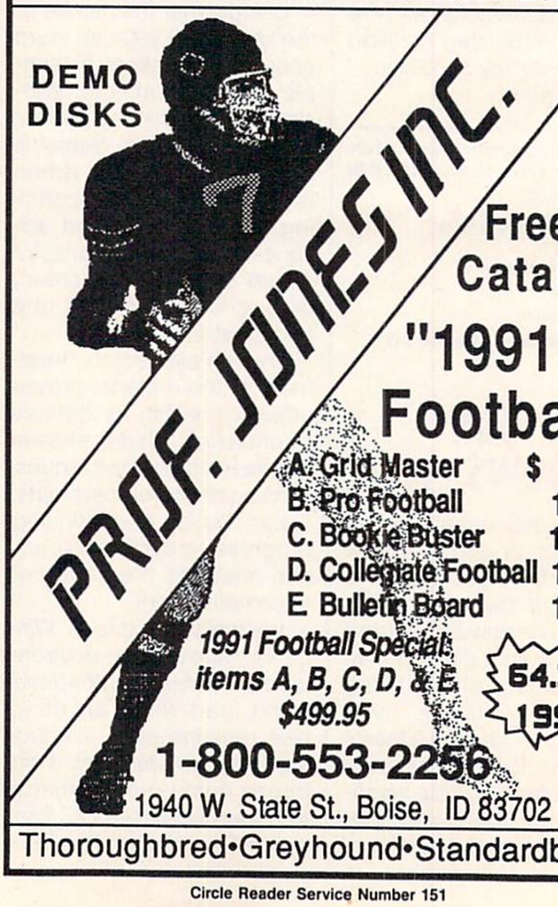

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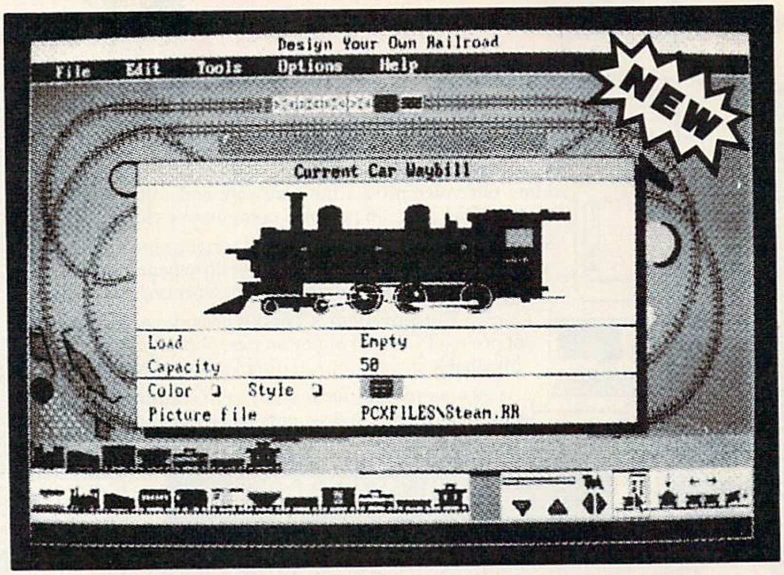

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Mouse Pads	5

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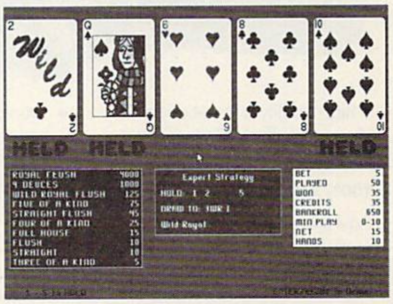

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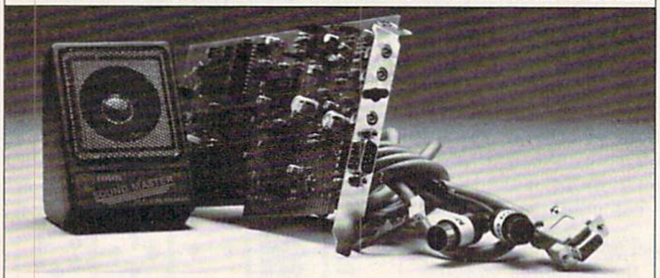

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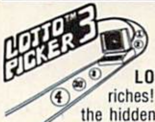

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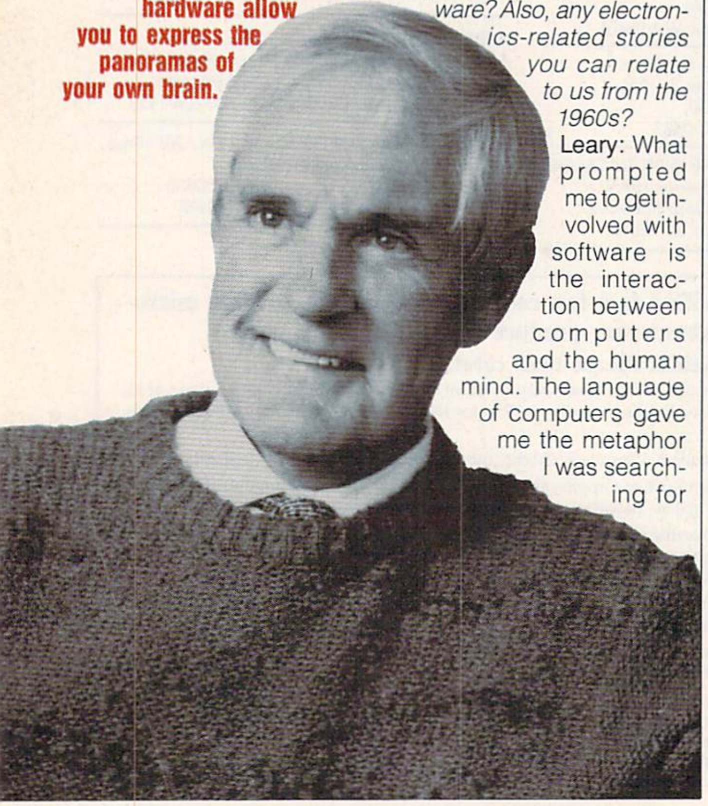
MIND EXPANSION

Timothy Leary is the former Harvard psychology professor whose philosophy, "Tune in, turn on, drop out," changed the face of America in the 1960s. Since then, his interests have turned to computers and virtual reality. Periodically, Dr. Leary appears on America Online for informal interaction with subscribers. Here is the transcript of one of his recent appearances.

Timothy Leary: Let me say a few words about what's going on in my life these days. We're working on a newsletter which has a tentative publication date of July 4th. The name is tentatively "Timothy Leary's Animations." The newsletter will be very interactive. We'll be soliciting articles from our readers for future editions.

Electronic devices like the new computer-graphics hardware allow you to express the panoramas of your own brain.



Question: Dr. Leary, what prompted you to get into software? Also, any electronics-related stories you can relate to us from the 1960s?

Leary: What prompted me to get involved with software is the interaction between computers and the human mind. The language of computers gave me the metaphor I was searching for 20 years ago. As [for] the 1960s, that's a "whole nother lifetime." We're now in the 1990s. Why look back?

Q: Tell us about your software for mind expansion.

Leary: The reasoning behind the mind expansion software is the empowerment of the individual where everything that appears on the screen is what *you* have put there.

Q: What have you been doing in recent years, Dr. Leary?

Leary: I'm the head of two very influential software development companies. One is called FUTIQUE, and the other is TELELECTRONICS. We are developing 3-D electronic environments for the Mac, IBM, and the new 16-bit videogame appliances. Our company's aim is to load onto compact disc prefabricated fully furnished homes, gardens, landscapes, and any environment that the user would like to "boot up."

Q: What do you think about the Libertarian party?

Leary: I am an enthusiastic member of the Libertarian Party. I think that in politics the politicians of both parties, Democratic [and] Republican, pander to the lowest common denominator. Therefore, Newton's Law of Politics is true: "In politics the scum rises to the top." For this reason, I back the Libertarian Party. Our aim is to diminish, decrease, decimate the power of the state to interfere in the individual's life.

Q: Have you been doing any experiments with virtual reality?

Leary: Yes, I am involved with several groups developing TELEPRESENCE environments and electronic environments. I probably give more lectures and demonstrations about VR than anyone in the field.

Q: When will Mind Mirror *be available for Macintosh?*

Leary: We are trying to get an update and revision of *Mind Mirror* for the Mac. With graphics, graphics, and more graphics! It is one of the two great sorrows of my life that *Mind Mirror,* my wonderful head program, was never translated for my Mac-using friends.

Q: Do you have software [currently available] for the Macintosh?

Leary: I do not have functioning Mac software. I can, however, strongly recommend four Mac products which convert the screen into a comfortable, livable, 3-D environment. These programs are 1) *Virtual Valerie,* 2) *Spaceship Warlock,* 3) *Manhole,* and 4) *Cosmic Osmo.*

Q: What about the software you're currently working on?

Leary: We are working, as I mentioned before, on developing 3-D programs which will allow performers to select and move around in an electronic environment. Our programs are *interactor* theaters where a small group can assemble for purposes of education, entertainment, and enlightenment. The three *E's* of the electronic twenty-first century.

Q: Dr. Leary, could you comment on the advent of virtual reality? Someone pointed out that it couldn't compare to LSD. Do you see this new technology as a substitute for drugs?

Leary: No. Virtual reality isn't a substitute for organic psychedelic plants and drugs. Psychedelic drugs allow you to exit the repetitious word processes of your mind to boot up limitless programs, directories, and files in your brain. All of which, by the way, are technicolor, multimedia, and moving at the speed of light. On the other hand, electronic devices like the new computer-graphics hardware allow you to select electronic patterns and multimedia environments to express the panoramas of your own brain. ❐

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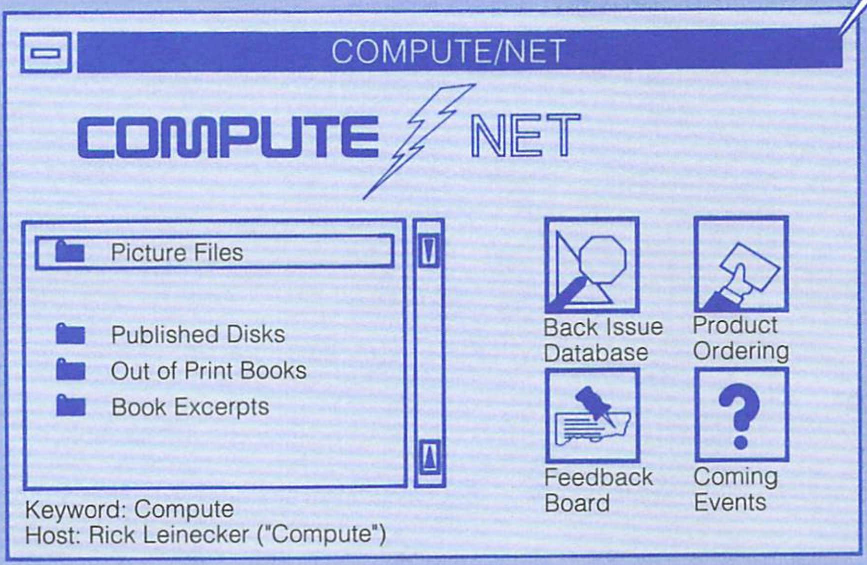

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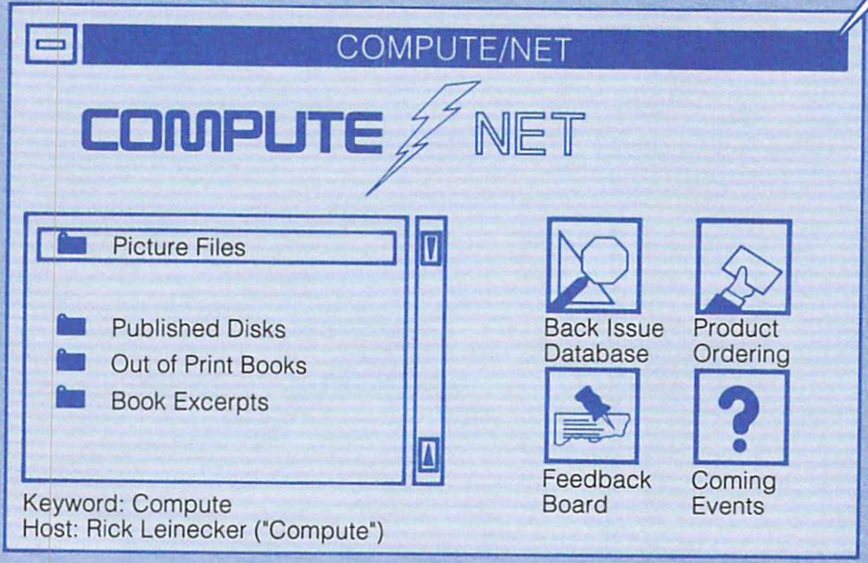
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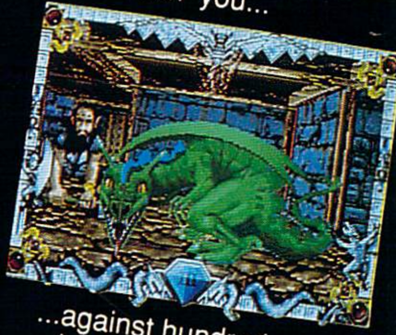
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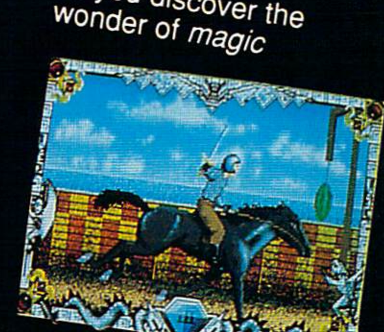
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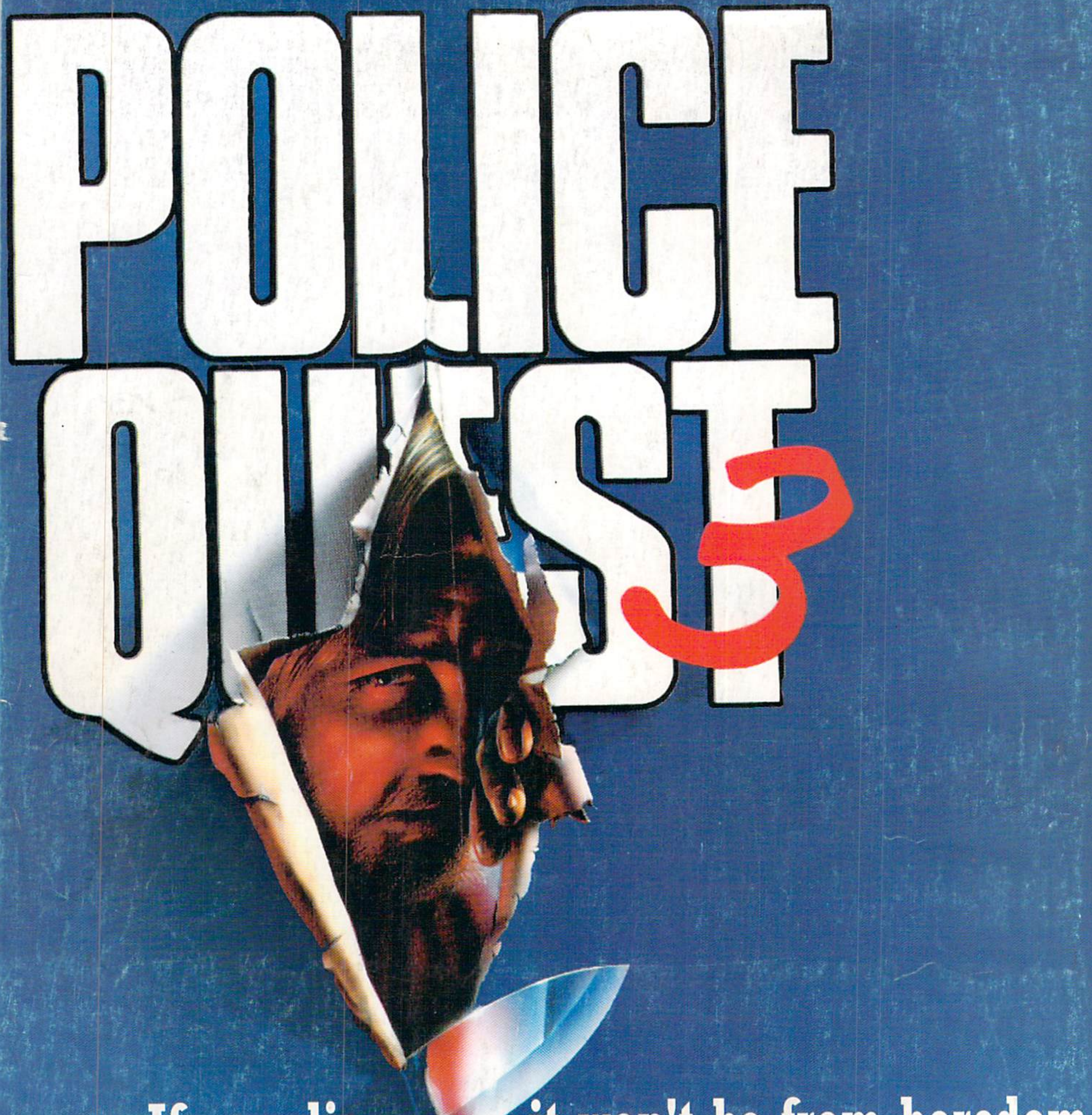
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